FACTORY

MANAGEMENT AND MAINTENANCE

AUGUST 1953

ON PAGE 82

Brand new for plants—

High-Frequency Fluorescent Lighting

ON PAGE 84

Easy-to-keep records tell you exactly . . .

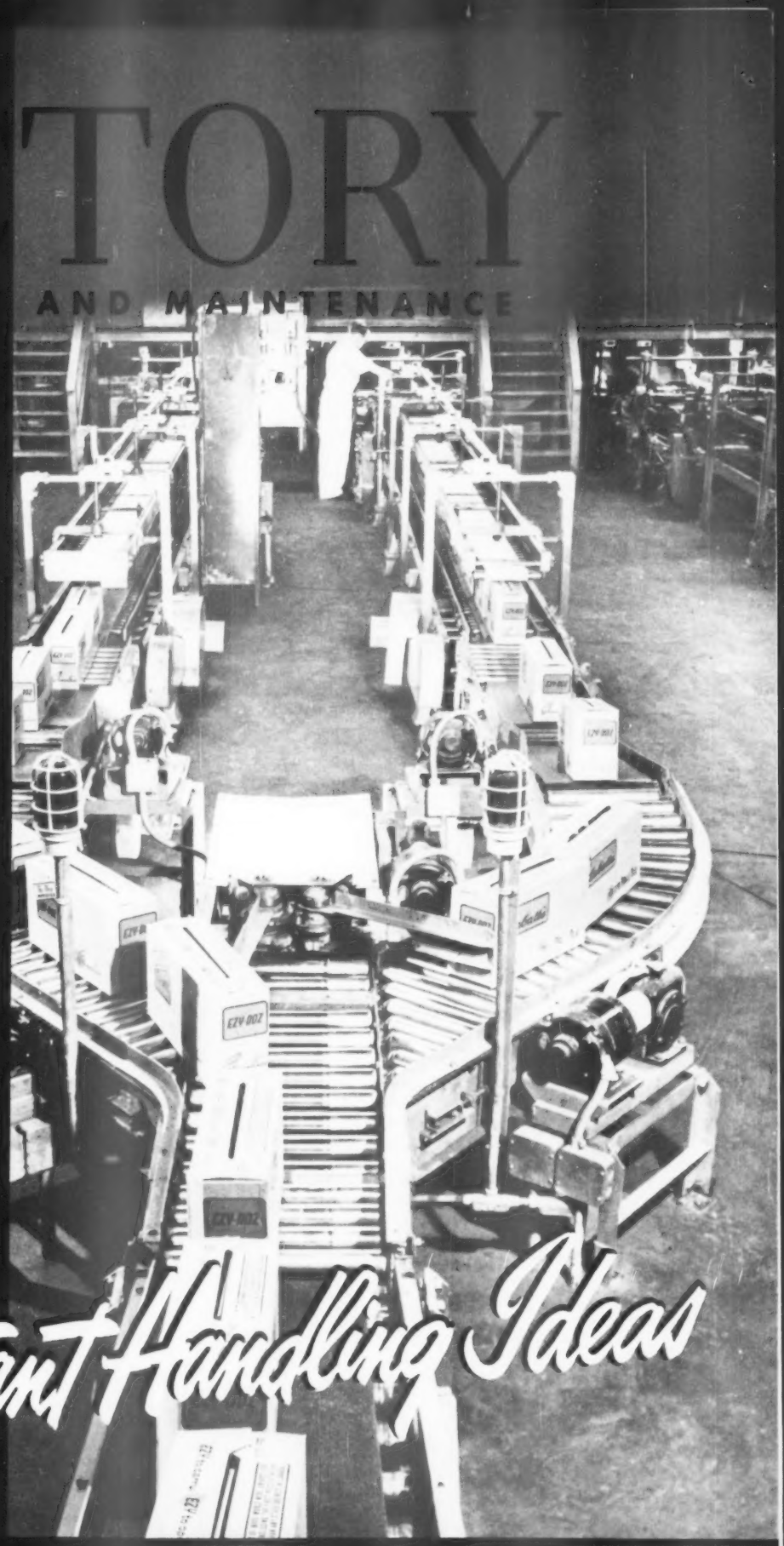
What Accidents Cost

ON PAGE 96

Six Steps to Better Inventory Management

ON PAGE 76

Important Handling Ideas



preference points on power transmission units

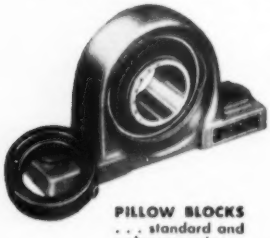
Not one but two GREASE PORTS!

A Two grease ports . . . 180° apart.

B Never more than 90° from lubrication fitting.

If you select power transmission units with re-lubrication in mind, you'll appreciate the importance of the Fafnir two-grease-port design to dependable ball bearing performance. There is always one grease port in the bearings' outer ring that is never more than 90° from the lubrication fitting . . . and this fitting, incidentally, can be your own type because Fafnir provides standard pipe plugs.

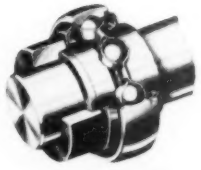
Point by point comparisons of design features, from the Fafnir-originated wide inner ring ball bearing with self-locking collar . . . easiest of all to install . . . to the frictionless Mechani-Seals . . . explains the steadily-growing preference for Fafnir Ball Bearing Power Transmission Units. For details, call your nearby Fafnir distributor. The Fafnir Bearing Company, New Britain, Conn.



PILLOW BLOCKS
. . . standard and heavy series

FLANGE CARTRIDGES
. . . standard and heavy series

CYLINDRICAL CARTRIDGES
. . . standard and heavy series



WIDE INNER RING BALL BEARINGS
. . . with Mechani-Seals

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Free facts on how B. F. Goodrich improvements can save you money

WHATEVER you use of rubber, there are savings here for you, too. B. F. Goodrich research has developed conveyor belts which can last 10 times longer under impact; oilproof air hose; grommet V belts which have cut some belting costs as much as 90%; burstproof steam hose; rubber springs, linings, rolls and many other items which increase workers' safety, make new products possible, and put older products back in the profit column.

B. F. Goodrich makes the most complete line of industrial rubber goods in America, and is constantly at work by research to improve every one of them. Don't assume *anything* you use of rubber is the best—send the coupon for free facts on what improvements B. F. Goodrich has made in it recently. There is no cost to you but there can be important savings. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

The B. F. Goodrich Company
Dept. M-36, Akron 18, Ohio

I'm interested in the products I have checked below:

☐ Conveyor belts ☐ V belts
☐ Other belts (name type)_____
☐ Hose (name type)_____
☐ Other rubber products_____
☐ Please send me further information.
☐ Please have a BFG distributor see me.

Name_____
Company_____
Address_____

FACTORY
MANAGEMENT AND MAINTENANCE

COMPLETE CONTENTS • AUGUST 1953 • STARRED ITEMS

special report

Important Materials Handling Ideas . . . . . 76 ★

production

Electronic Scale Makes Packing Line Really Automatic 91
Narrower Aisles, Higher Stacking for More Storage . . BY H. I. BERNBAUM 92 ★
Six Steps to Better Inventory Management . . . . . BY H. F. DICKIE 96 ★
Better Methods Cut Retail Price 10% 101
Cycle Charting With "Handligs" . . . BY W. W. PHILLIPS AND S. W. EARLE 105 ★
Gage Control Cuts Rejects to 2% . . . . . BY RALPH HIXENBAUGH 112 ★
Space Heaters for Process Heating 126

plant engineering and maintenance

High-Frequency Fluorescent Lighting . . . . . BY J. W. ST. ANDRE 82 ★
Eight Fundamentals of Preventive Maintenance . . BY A. D. BUSCHMANN 87
Keeping a Suburban Plant Fire-Safe . . . . . BY L. R. ANGLIN 110
Work Measurement to Cut Housekeeping Costs BY T. M. SHEA AND D. GRANATO 118 ★
Are You Misusing Your Wound-Rotor Motors? . . . . BY R. F. WOLL 122

For other articles dealing with plant engineering problems, see pages 76, 92, 105.

industrial relations

Records Tell How Much Accidents Cost Us . . . . . BY H. K. HILTON 84 ★
The Old Man Squints Backward — *a Toby Quint Episode* BY R. W. SHERMAN 116
New Twist on "Charity Check-Off" 121
What to Ask an Applicant — *Management Data Sheets* 134
Worker Psychology — a Formula That Works . . BY DANIEL KRAKAUER 218
Passing the Buck Up . . . . . BY L. A. APPLEY 262

See also Tips to Good Human Relations, page 108.

editorial

Organization Is Still a Big Problem 75

departments

Looking Ahead in Business *after* 72
Looking Ahead in Labor . *before* 73
Ideas of the Month 94
Operating Shorts 102
Tips to Good Human Relations . 108
Joe's Electrical Department . . 124
New Free Catalogs 128, 242
Maintenance Pointers 130
What's New in Equipment . . 140
Practical Labor Relations . . . 204
Plant Engineering Problems . . 250
Plant Operating Problems . . . 254
New Materials 268
Books and Booklets 272
Industrial Films 280

FACTORY MANAGEMENT AND MAINTENANCE

AUGUST . . . . . **Vol. 111, No. 8**

(a consolidation of Factory and Industrial Management, including Factory, and Maintenance Engineering) Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Executive, Editorial, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y.

Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Factory Management and Maintenance — Subscription Service, 330 W. 42nd

THE MAGAZINE
OF PLANT MANAGEMENT
FOR 62 YEARS

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

ARE HIGHLIGHTED HERE

PAGE

76 **CANADIAN BREWER'S NUMBER 1 SPECIFICATION FOR** a new bottling plant was "the most modern handling system that can be devised." Labatt Ltd. came very close to getting just that. Here are a dozen of its better materials handling ideas.

82 **OLD STUFF MAYBE FOR BUSES AND AIRPLANES, BUT** brand-new for industry. High-frequency lighting has amazing advantages you'll want to know about. See list with article.

84 **GET YOURSELF SOME RECORDS THAT FORCE ANALYSIS** and follow-up — if, like Barber-Colman, you're looking for a major improvement in safety performance.

92 **HOW AMERICAN GREETINGS CORP. STORES 25% MORE** pallet loads in the same floor space. A good trick anyone can do.

96 **NO HELP FOR THE MAN WHO "CONTROLS" INVENTORY** by slashing. But a blueprint for anyone who's looking for a sound program that makes slashing unnecessary.

105 **YOUR CHANCE TO TAKE A LONG, HARD LOOK AT A NEW** technique for charting and analyzing materials handling operations. It's a real time-saver.

112 **GOOD GAGE RECORDS, GOOD GAGE STORAGE CRIB, GOOD** gage inspection, good gage time table — all add up to *good gage control* at Aeroquip Corporation.

118 **NOT GETTING ALL YOUR MONEY'S WORTH OUT OF YOUR** janitorial operations? Neither was Sharp & Dohme — until it discovered that work measurement works just as well in maintenance as it does in production.

COMING IN SEPTEMBER

AUTOMATIC CONVEYORS in G-E plant bridge handling gap between assembly and storage . . . How Hercules Powder organized its incomparable **APPRENTICE PROGRAM** (best we've seen) and what it takes to run a program like it . . . Low-down on **POWER BILLS** — what's in 'em, how to cut 'em.

Publisher
ALFRED M. STAEHLE

Editor
HARRY LEE WADDELL

Managing Editor
LEWIS K. URQUHART

Associate Editors
ROBERT S. RICE, Industrial Production
CARL G. WYDER, Maintenance
J. W. ST. ANDRE, Electrical
M. J. MURPHY, Industrial Relations
CARROLL W. BOYCE, National Affairs
R. A. DILLEY, Midwestern Editor, Cleveland
W. F. WAGNER, Jr., Western Editor, Chicago
GEORGE L. SMITH, Layout

Assistant Editors
DORA MITCHELL
DON BAIRD
NORMAN WEISSMAN
JOHN F. GOLDSMITH
WARREN J. KING
MORLEY G. MELDEN

Consulting Editors
L. C. MORROW
A. H. MOGENSEN
H. B. DUTTON
CHARLES B. GORDY

Washington Bureau
GEORGE B. BRYANT, Jr., Director
J. M. GAMBATESE, Labor

McGraw-Hill Department of Economics
DEXTER M. KEEZER, Director

McGraw-Hill World News
J. K. VAN DENBERG, JR., Editor
London, Paris, Frankfurt, Rio de Janeiro, Tokyo, Mexico City, Manila

Advertising Sales Manager
H. R. MATHIAS

Research Manager
CHARLES S. MILL

District Managers
G. E. POMEROY, Boston
J. S. CAWLEY, G. R. RAMEL, New York
E. J. MACAULAY, Philadelphia
R. W. GARRISON, Pittsburgh
R. C. GREINER, Cleveland
T. W. VAN WINKLE, Detroit
A. B. MARTIN, R. P. ROSE, Chicago
W. R. PANKOW, St. Louis
J. H. ALLEN, Los Angeles
J. W. OTTERSON, R. E. DORLAND, San Francisco
R. H. SIDUR, Atlanta
J. H. CASH, Dallas

Other offices at Washington and London

St., New York 36, N. Y. Allow one month for change of address.

Factory Management and Maintenance solicits subscriptions only from production, maintenance, and management executives, and engineers in manufacturing plants. Please indicate company connection and title on all subscription orders.

Single copies, 50¢; in all foreign countries, $1.50. Subscription rates: United States, U. S. possessions, $3, 1 year; $4, 2 years; $5, 3 years. Canada, $5, 1 year; $8, 2 years; $10, 3 years. Latin America and Philippines, $15, 1 year; $25, 2 years; $30, 3 years. Other countries, $20, 1 year; $30, 2 years; $40 3 years.

Entered as second-class matter July 22, 1948, at the post office at New York, New York, under the Act of March 3, 1879. Printed in U.S.A. Copyright 1953 by McGraw-Hill Publishing Company, Inc. All rights reserved.

14 minutes by hand . . .
Now 3 minutes with push-button brushing

This strip act with Osborn wire brushes is taking off costly hours in the production of d-c motor armatures . . . typical of savings being discovered throughout industry with push-button brushing methods.

The job here is to remove enamel insulation from copper wires to assure top quality soldered connections. Formerly done by a tedious hand-scraping method, the time per armature was 14½ minutes. With the motor-driven brushing device shown the time has been cut to 3 minutes. As the armature is turned, a pair of Osborn Disc Center wire brush heads rotate downward on the wires and the insulation comes off clean.

This is typical of thousands of production jobs which have been simplified with the help of the **O**sborn **B**rushing **A**nalyst. For help to improve *your* cleaning, finishing or deburring operations, call your **OBA** or write *The Osborn Manufacturing Company, Dept. H-8, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

FREE: New booklet on deburring with Osborn Power Brushing. Write for your copy.

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

how do YOU pronounce

HINDE & DAUCH

HINDE rhymes with FIND
DAUCH is pronounced DOWK

Say HIND and DOWK
America's Authority on Packaging.

CoraGated

©H&D

our 65th year

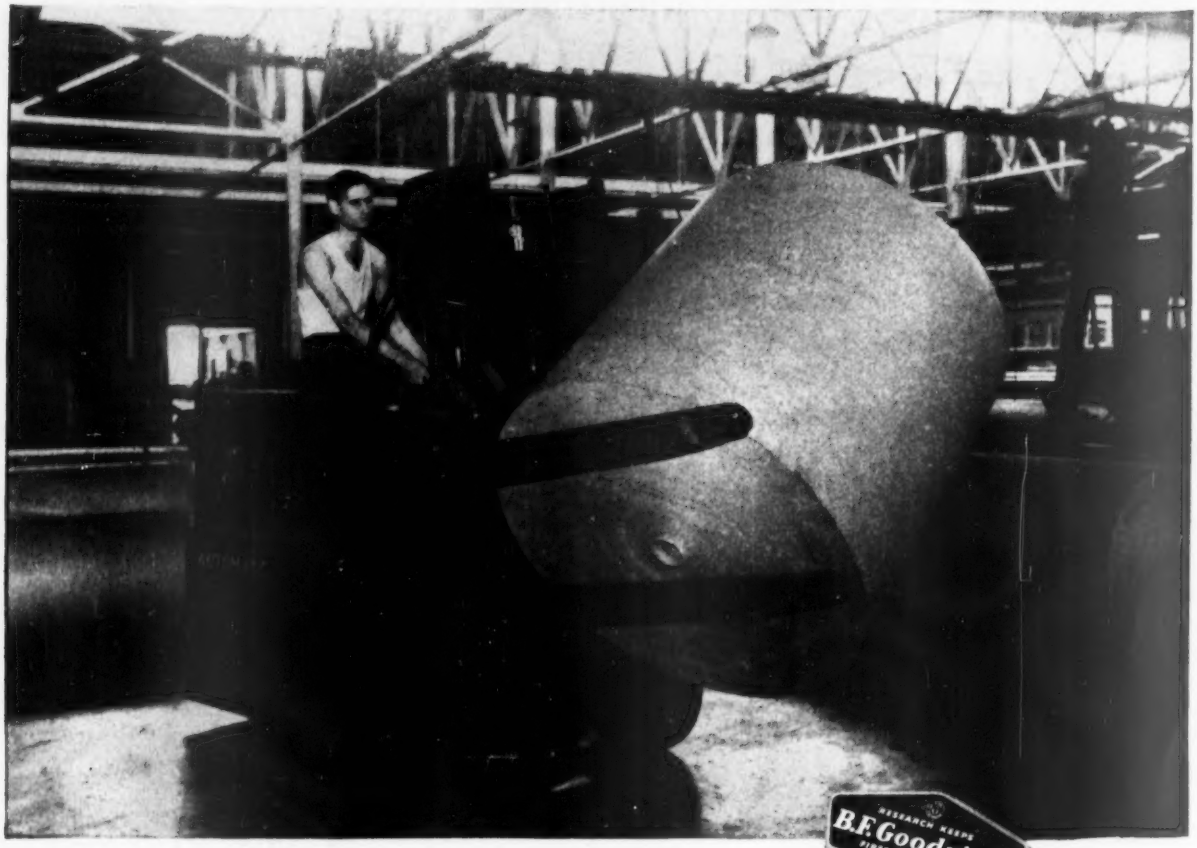
H&D® HINDE & DAUCH

SANDUSKY 2, OHIO

17 MILLS AND FACTORIES • 40 SALES OFFICES

B.F.Goodrich

TW ANALYSIS man puts an end to unnecessary industrial tire cutting, chipping



Save as much as 50% on tire costs

Debris-strewn floors, sharp projections along trucking aisles or on the trucks themselves, overloading and collisions all can cut and chip an industrial tire. Or tire failure may be caused by the tire being used on a job for which it was never designed.

The B. F. Goodrich Tire and Wheel Analysis man can put an end to unnecessary tire troubles, can save you up to 50% on industrial tire costs. He knows which tire is right for any given set of operating conditions —solid, semi-pneumatic or pneumatic—which tread design and compound is best to use. Without obligation, he will put his training to work on your problems, recommend the right tires for you to use, give you maintenance tips that can cut costs as much as 20%.

The TW Analysis man's advice is impartial, for B. F. Goodrich makes, and BFG retailers sell, a complete line of industrial tires. Use the tires he recommends and save yourself unnecessary tire expense. Get increased, maybe even doubled, tire life.

To find out more about this free B. F. Goodrich Tire and Wheel Analysis Plan, send in the coupon or call your BFG retailer. A special TW Analysis Plan is available for manufacturers of industrial handling equipment.

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Department TW-163, Akron 18, Ohio

Please send me:

☐ *Additional information* on your new Tire and Wheel Analysis Plan

☐ A free copy of your "Industrial Tire Guidebook"

Name_____

Company_____

Street_____

City_____ Zone____ State_____

BAKER TRUCKS *at work*

Westinghouse saves in excess of $57,000 per year by FORK TRUCK HANDLING

Illustrated above is a special stringer pallet which enables Baker Fork Trucks to tier and transport drums four at a time, doubling storage capacity and speeding these operations substantially by eliminating manual methods.

This method of handling scrap saved $9,000.00 in one year. Driver merely operates controls—the truck does the work.

Handling castings in yard storage on pallets with Fork Trucks saves $7500.00 per year over former methods—and multiplies storage capacity by tiering.

By palletizing bagged materials for fork truck handling, tiering to warehouse ceiling more than doubles storage capacity. This method cuts handling costs $12,000.00 per year.

- A fleet of fork trucks including Bakers, coupled with intelligent planning and material handling engineering, enables Westinghouse Electric Corporation to cut handling costs more than $57,000.00 per year at its huge East Pittsburgh works. Savings in which the Baker Trucks participate, include:

- **$12,000.00 warehousing raw materials in the molded materials section**
- **Another $12,000.00 handling finished molded products**
- **$9,000.00 on one scrap handling operation**
- **$7,500 by handling castings on pallets in yard storage**
- **100% added storage capacity in molded materials warehouse**
- **Doubling capacity of drum storage space in yard**

These savings were made possible by replacing manual handling and other slow methods with efficient fork-truck unit-load handling. In some instances Westinghouse devised special pallets and containers to achieve greatest speed and efficiency from their versatile Fork Trucks.

THE BAKER-RAULANG CO. 1953 1953 THE BAKER-RAULANG CO.

Write for *your copy of the "Baker Handling Library" a new portfolio of actual case histories.*

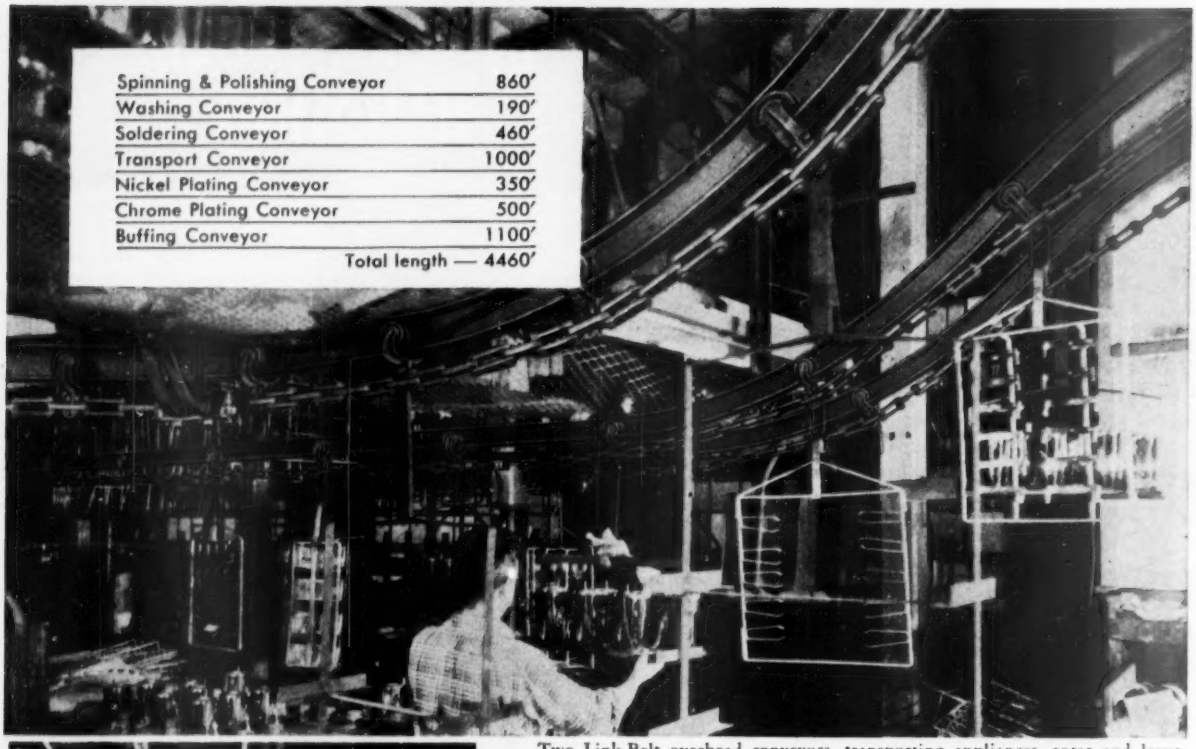
THE BAKER-RAULANG COMPANY
1218 WEST 80th STREET • CLEVELAND 2, OHIO

The Baker-Lull Corporation, Subsidiary, Minneapolis, Minnesota
Material Handling and Construction Equipment

Baker
industrial trucks

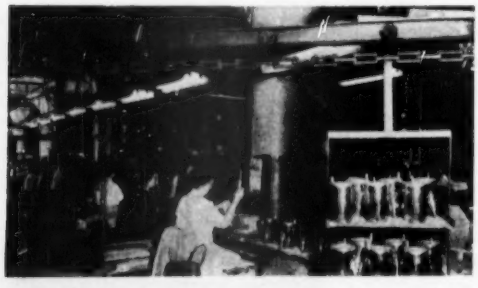
From shaping of raw materials to final assembly...

appliances move on 7 Link-Belt Overhead Trolley Conveyors



Two Link-Belt overhead conveyors, transporting appliances, enter and leave inspection room at this junction.

Conveyor moves percolators through buffing operation with minimum handling.



Overhead conveyor moves automatic electric percolators from plating room to assembly station.

Landers, Frary and Clark step up production, save space in 5-floor plant

THE ease and economy with which Landers, Frary and Clark handle appliances in their five-floor New Britain (Conn.) plant are typical of the advantages of Link-Belt Overhead Trolley Conveyors. Plants all over the country have found these efficient conveyors the answer to increased production at lower cost.

Travel in many paths at synchronized speeds. Straight-line production regardless of physical layout. Conservation of floor space. Release of manpower for production jobs. You get all these, thanks to Link-Belt's vast engineering experience in meeting conveying problems for all industries.

Put Link-Belt's quality products plus engineering ingenuity to work for you. Our engineers will work with you and your consultants . . . help you set up smooth, steady, straight-line production.

LINK-BELT

13,147

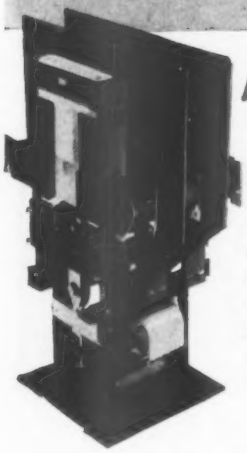
OVERHEAD TROLLEY CONVEYORS

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

which contactor meets your needs

AIR or OIL?

Either may be built into your Allis-Chalmers Type H starter along with meters, overload relays, current limiting fuses, auxiliary switches . . . the coordinated components dictated by your application for complete protection of man, motor and machine.

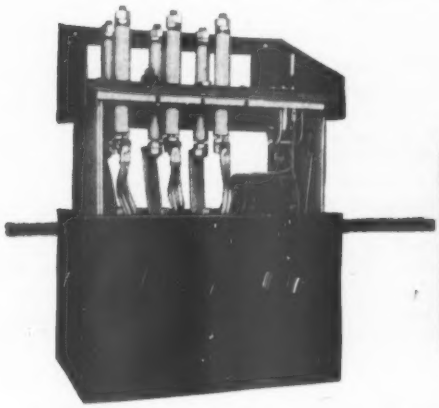


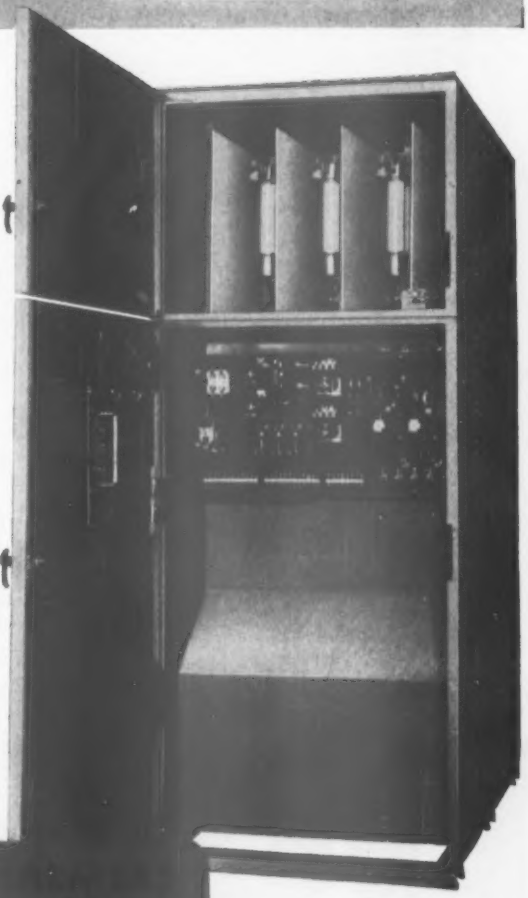
AIR-BREAK CONTACTOR

When the going's rough . . . that's the place for the Type 256 air-break contactor. Frequent starting, inching, reversing or dynamic braking are taken in stride by this rugged performer. And, of course, fire hazard is greatly reduced. No turning shafts, shaft bearings and flexible leads to cause maintenance headaches. Double-break contacts, vertical action and dual blowouts provide long, trouble-free operation.

OIL-IMMERSED CONTACTOR

Got atmospheric troubles? The Type MO oil-immersed contactor will perform heavy duty starting service in dust-laden, corrosive and very moist atmospheres. Contactor is of the time-proved clapper type. Self-cleaning, rolling-wiping action extends contact life. Make and break arcing occurs only on tips. Self-aligning E type magnet provides perfect armature seating . . . long, quiet operation. Permanent windlass tank-lifter simplifies maintenance. A-4103

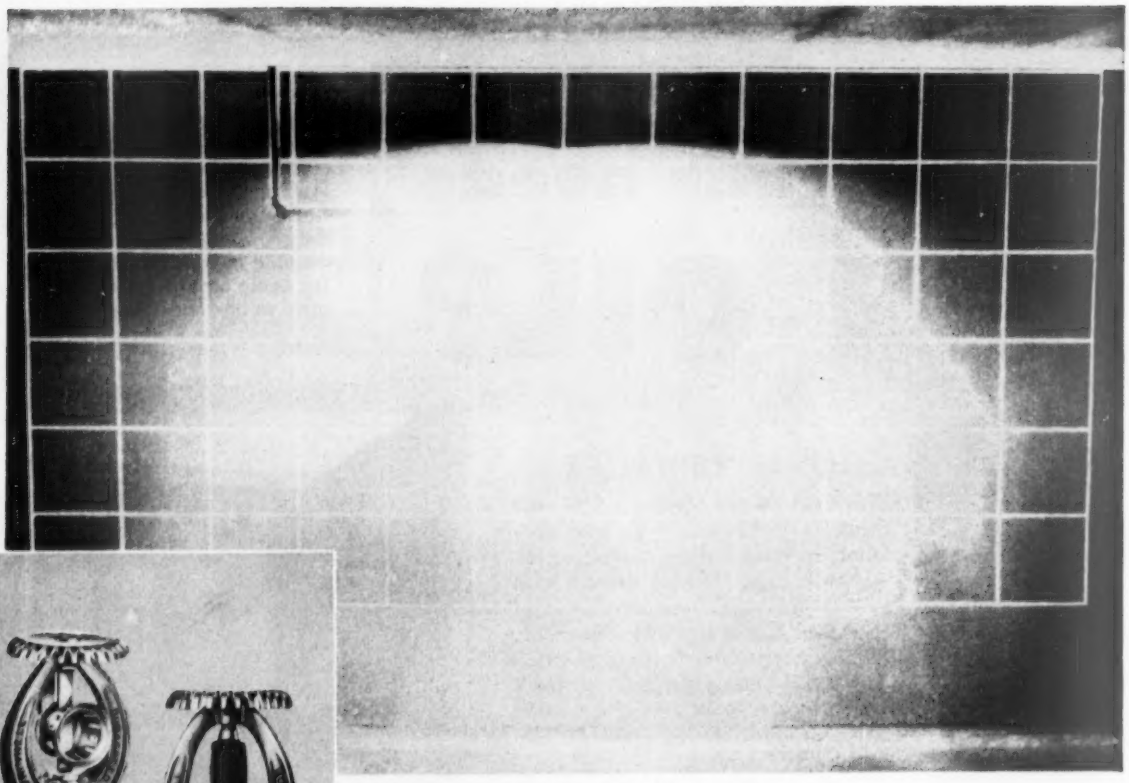


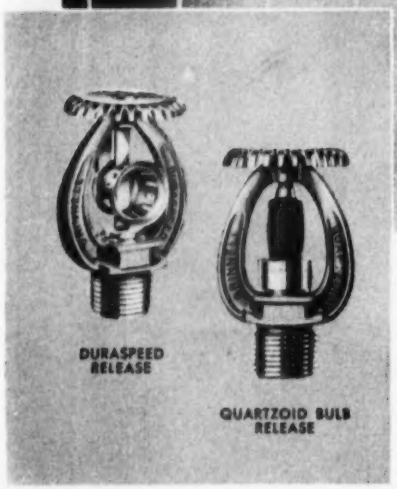


Type H Starters

Call Your Nearby A-C Representative or Write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 14B6410B.

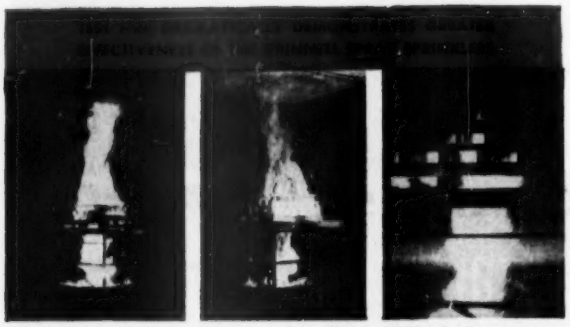
ALLIS-CHALMERS





Features: approved by Factory Mutual Laboratories; listed by Underwriters' Laboratories, Inc. • interchangeable with conventional sprinklers • unexcelled release mechanisms.

Put out *MORE FIRE* with *LESS WATER*



Test fire is under way. Under the wood crib is a torch fed by a constant flow of gasoline which prevents extinguishment of the fire. The vapors distilled off from both wood crib and gasoline torch feed the flames which lick ceiling panel.

Heat opens Grinnell upright spray sprinklers. Flame column starts to thin out and break up under the attack of fine sprays. Water vapor from these sprays dilutes the flammable fire gases to extinguish the destructive flames.

Within 4 minutes, sprays have practically killed the fire. After 30 minutes, with torch still roasting wood crib, it was far from destroyed. Ceiling panel was only slightly flame-blackened — even though no water was directed against it.

GRINNELL AUTOMATIC SPRAY SPRINKLERS

provide:

- better protection — the greater the hazard, the greater the improvement in protection
- improved water distribution —*less* water puts out *more* fire.
- more uniform coverage— from multiple operation or from a single sprinkler
- more effective ceiling protection—without wetting the ceiling
- lowered ceiling temperatures —no unnecessary sprinkler openings

why:

- cool fire gases to prevent fire from spreading—by the faster evaporation of the smaller water droplets
- control fire by producing an unburnable mixture of flammable vapors and water vapor
- dilute and diminish supply of flammable vapors with water vapor . . . evaporation of water removes heat, stops the distillation of the flammable vapors from solids—and from many liquids

Send for booklet describing Grinnell Spray Sprinklers in detail.
Grinnell Company, Inc., Providence, R. I.
Sales offices in principal cities.

GRINNELL
FIRE PROTECTION SYSTEMS

Manufacturing, Engineering and Installation of Automatic Sprinklers Since 1878

Small Component... or Complete Unit... You* can count on getting whatever You* need—

Added Evidence that—

Everyone Can Count on VEEDER-ROOT

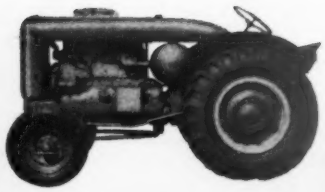
This REEL CONTROL BOX, complete with its *built-in* counting mechanism, indicates the number of feet of antenna reeled in and out of certain types of military aircraft. Manufactured completely by Veeder-Root, including outside bakelite cover and box, this unit shows another imaginative application of the universal language of direct-reading *Count*rol.

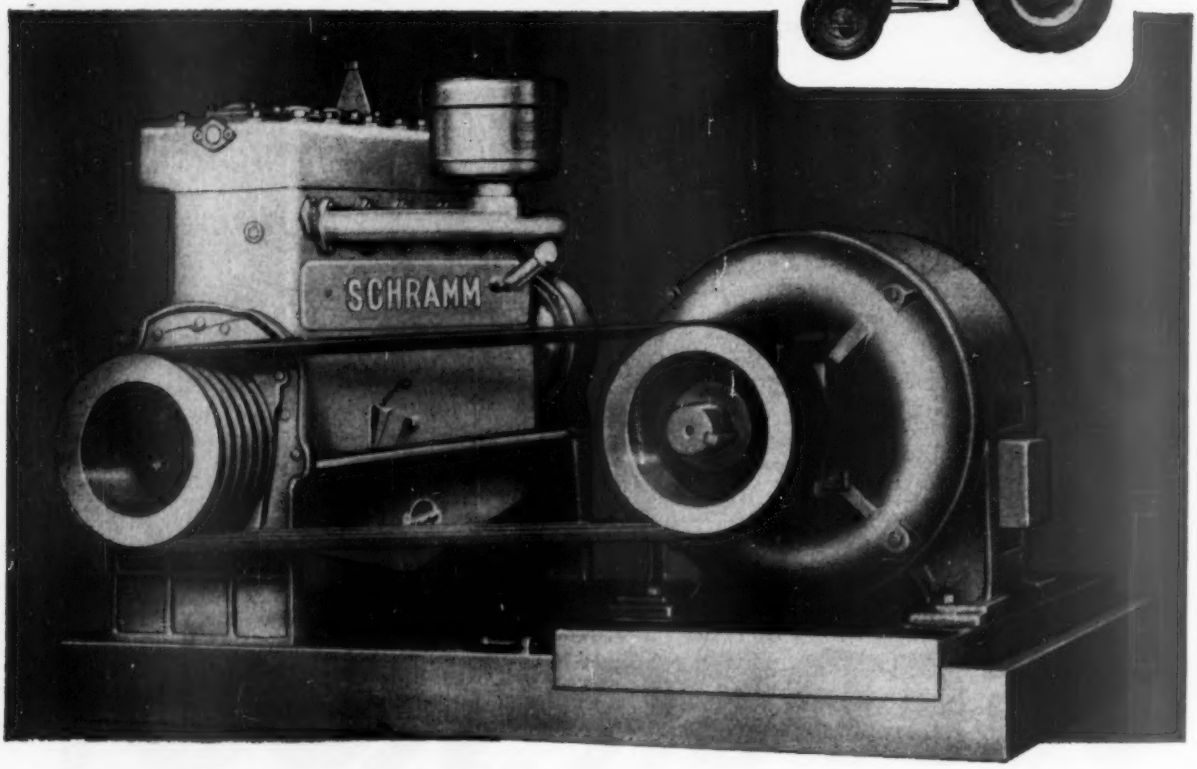
Now if you, *in any of your defense work,** have a counting problem, then you can count on Veeder-Root to help you in every possible way.

VEEDER-ROOT INCORPORATED
"The Name That Counts"
HARTFORD 2, CONN. • GREENVILLE, S.C.
Montreal 2, Canada • Dundee, Scotland
Offices and agents in principal cities

"Counts Everything on Earth"

Teamed for Top Performance!





...SCHRAMM Air Compressors and *Gilmer* V-Belts

Wherever air compressors are used, the name Schramm is known and respected. Often called upon to operate for long periods under adverse conditions, Schramm compressors are built to take it— right down to the GILMER V-BELTS that drive the stationary models and operate the cooling fans of both stationary and portable models.

Like so many other leading manufacturers, Schramm Inc. has for years relied upon GILMER V-BELTS as standard factory equipment on its products.

What more convincing endorsement could any V-belt buyer ask than the fact that such manufacturers, with proud reputations to uphold, team up with GILMER V-BELTS to assure top performance of their own products!

You'll do well to follow their example. Let your local NYB&P-GILMER Distributor supply all your V-belt requirements—from the heaviest multiple V-belt drive to the lightest fractional horsepower drive. Make sure you get *top performance* on every drive!

Gilmer **V-BELTS AND "TIMING" BELTS**

NYB&P INDUSTRIAL RUBBER PRODUCTS

NYB&P — NEW YORK BELTING & PACKING CO. — Founded 1846

NEW YORK BELTING & PACKING CO. 1 Market St., Passaic, N. J.

America's Oldest Manufacturer of Industrial Rubber Products

get MORE for your truck dollar from

A combination of fork and low lift platform trucks are used in this large grocery warehouse to gain the advantages of both. This platform truck is making a long haul to the order-picking section. A fork truck will later place the top load on the floor.

because ELWELL-PARKER—

Furnishes ALL types—Elwell-Parker gives *unbiased* advice since it produces both gas and electric trucks. Basic models include high and low lift platform trucks, fork trucks, mobile cranes, tractors.

Builds trucks that cost less to operate—Unequalled design experience cuts maintenance costs and expensive delays due to truck breakdowns.

Offers FREE analysis by materials handling consultants—Resident E-P field men in all principal cities will survey your plant and help you select the most efficient handling system.

Provides service help—E-P Service Engineers make periodic calls to instruct your drivers and advise your maintenance department about proper servicing.

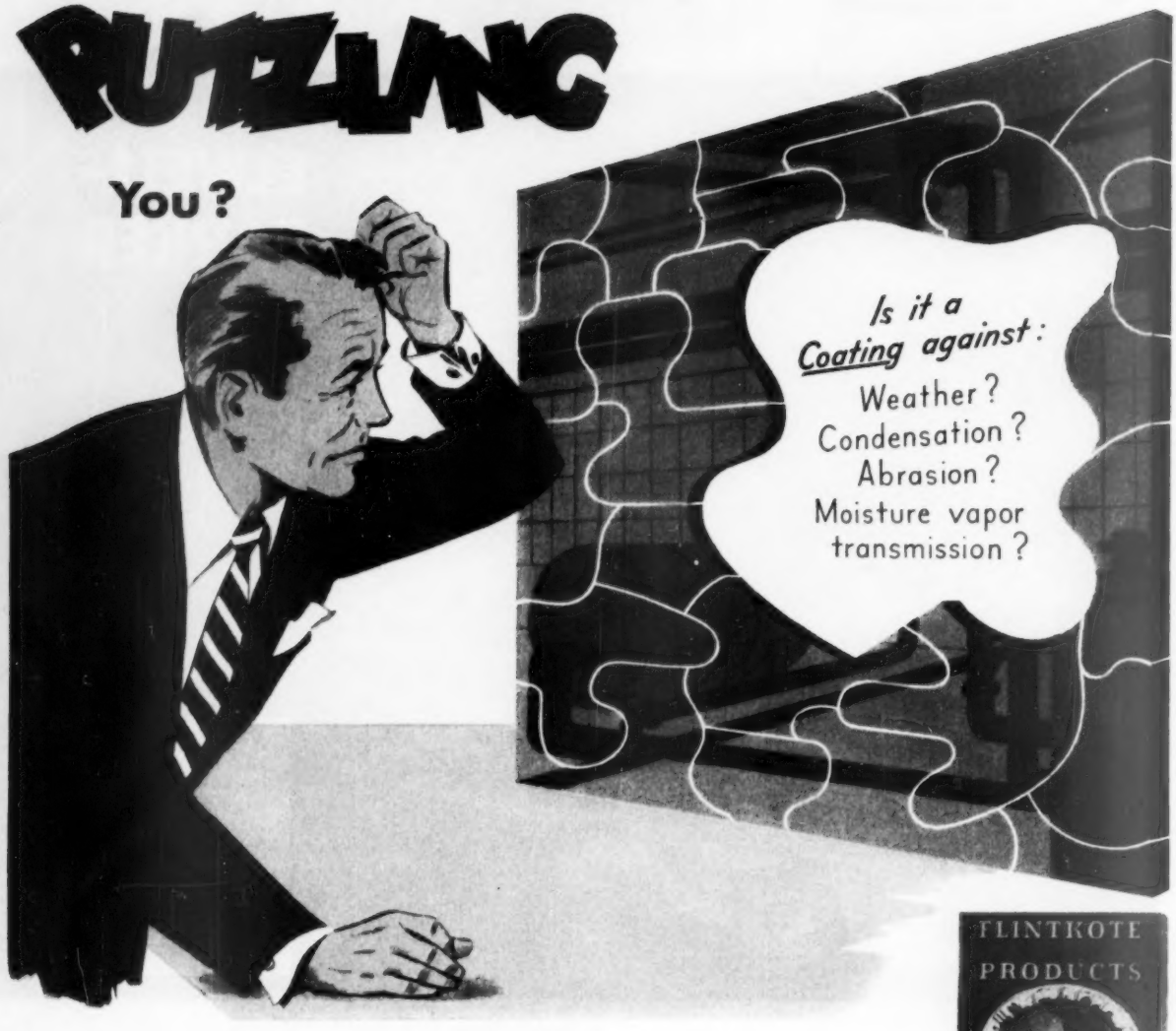
Get the full story on these *Plus Features* by writing for this General Catalog. The Elwell-Parker Electric Co., 4027 St. Clair Ave., Cleveland 3, Ohio.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

Is Insulation Protection

PUZZLING

You?



Are you having trouble trying to figure the most effective and economical *protection* for insulation on tanks, ducts, boiler walls, refrigerated rooms?

Flintkote's wide line of asphaltic cements and coatings—both emulsions and cut-backs—will provide *exactly* the protection that will best fit into *your* picture.

Flintkote Insulation Coatings are cold-applied, formulated for high resistance to wear, weather, fumes, and moisture. They make your insulating job more effective in fuel and power savings by protecting your insulation against deterioration.

There are types for application by spray, brush or trowel.

Let Flintkote help solve your insulation protection puzzles. Look us up in Sweet's Files—and write for specification data.

THE FLINTKOTE COMPANY, *Industrial Products Division*, 30 Rockefeller Plaza, New York 20, N. Y., 55th & Alameda Streets, Los Angeles 54, Calif.

In Toronto, Ontario: THE FLINTKOTE COMPANY OF CANADA, LTD. *In London, England:* Industrial Asphalts Company, Ltd.

Over 50 years' specialized experience

At your service... by 'phone, mail or personal call. No obligation.

Ask for a free copy of this informative booklet.

FLINTKOTE
Products for Industry

30,000TH AUTOMATIC TRANSPORTER COMES OFF THE LINE!

John A. Baldinger, General Manager of Automatic and H. G. Framhein, Chief Engineer in charge of Transporters, see 30,000th Transporter come off line.

TWICE "'ROUND THE WORLD"

In continuous operation in our own plant since 1942, this Automatic TRANSPORTER, one of the first off the line, has traveled an estimated 50,000 miles—over twice around the world!

Yes, throughout industry, you see more Automatic TRANSPORTERS than any other operator-led electric truck. And little wonder, when you consider that—in addition to their superior, trouble-free performance, and their lower maintenance and operating costs, to our knowledge, *no Automatic TRANSPORTER has ever worn out!* That's because of "know-how" gained by Automatic in building the world's most complete line of electric-driven industrial trucks and attachments...since 1906. Before you buy any industrial truck, get the full facts on Automatics. Because there's a cost-cutting, "keyed-to-the-job" Automatic truck for every materials handling job.

Send today, for case histories of Automatic cost-cutting in your industry.

Automatic

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC DRIVEN INDUSTRIAL TRUCKS

Automatic® 39 West 87th Street, Dept. M-3 Chicago 20, Illinois

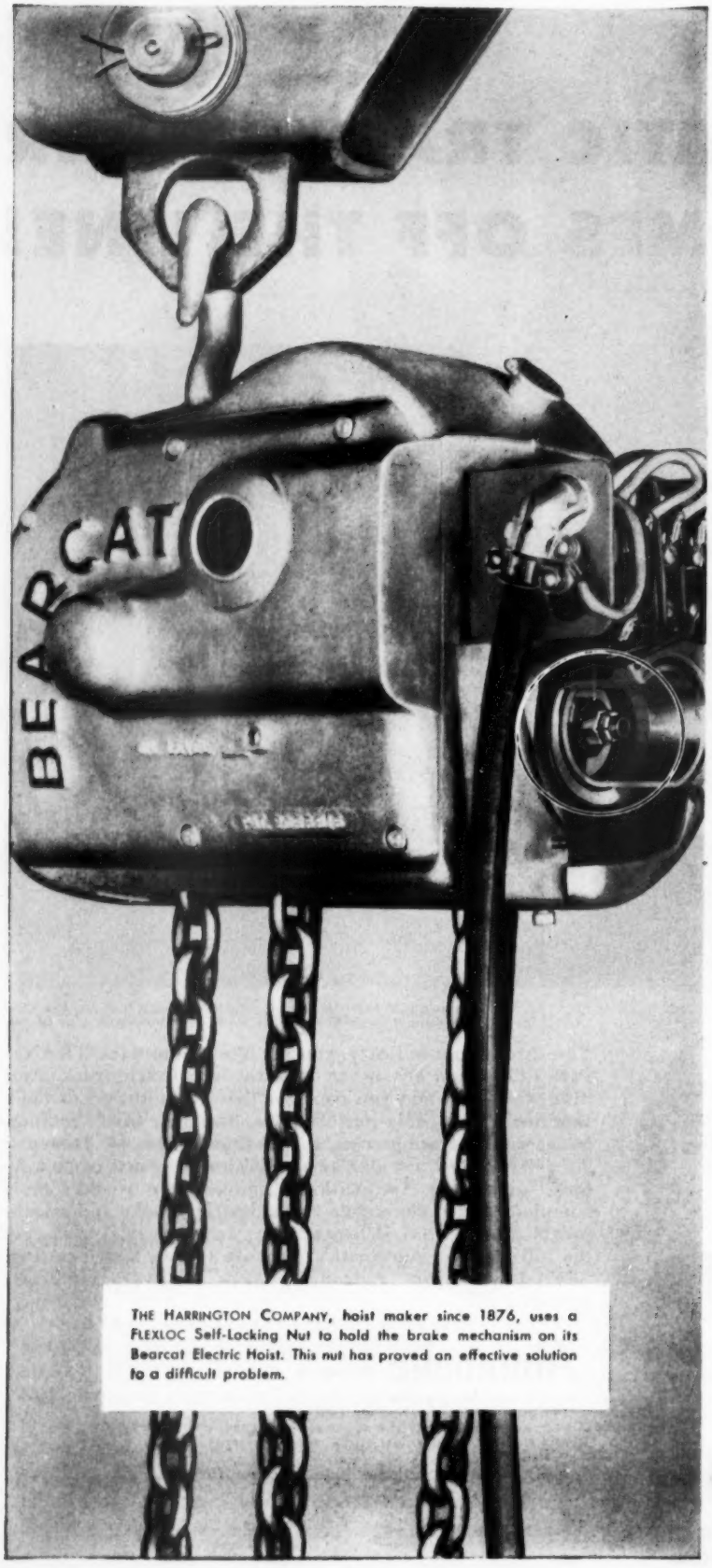
Please send complete facts:
—on Automatic TRANSPORTERS
—on Automatic's full line of industrial trucks
—with case histories that apply to our business

Company name: _____

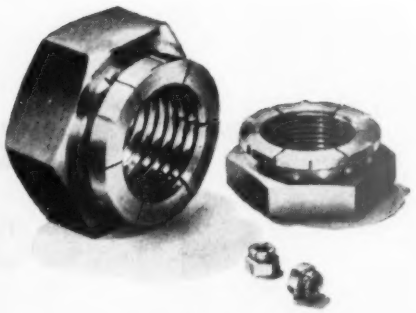
By _____ *Position* _____

Street Address _____

City _____ *Zone* _____ *State* _____



THE HARRINGTON COMPANY, hoist maker since 1876, uses a FLEXLOC Self-Locking Nut to hold the brake mechanism on its Bearcat Electric Hoist. This nut has proved an effective solution to a difficult problem.



Why FLEXLOCs are better locknuts

Compare the features of FLEXLOCs with those of any other nut, and you'll readily see why we say they are better locknuts.

FLEXLOCs are one piece, all metal. They require no lockwasher, no cotter pin, no auxiliary locking device to keep them on a bolt. They are not affected by moisture, dust or high temperatures. Standard FLEXLOCs are designed for temperatures up to 550° F.

FLEXLOCs are stop and lock nuts. They won't work loose once their locking threads are fully engaged; therefore they stay put anywhere on a bolt. Seating is unnecessary. And FLEXLOCs can easily be removed from a bolt and reused again and again without losing their locking ability.

For more information about FLEXLOCs and samples for test purposes, see your FLEXLOC distributor, or write SPS, Jenkintown 11, Pa.

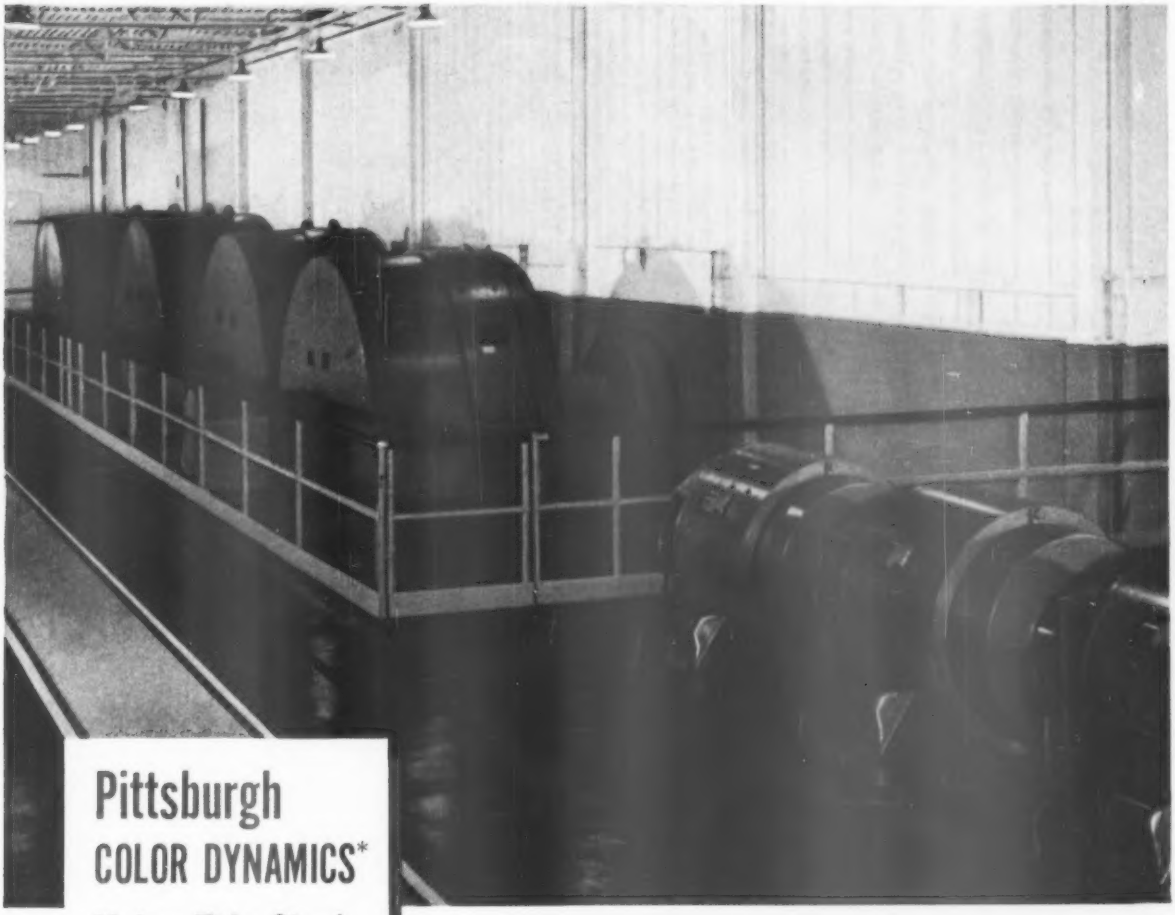
FLEXLOC®

LOCKNUT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

Our Fiftieth Year : A START FOR THE FUTURE



Pittsburgh COLOR DYNAMICS* Makes This Steel Plant Better And Safer To Work In!

Color is put to work in the hot and cold strip mills of Detroit Steel Corporation to improve working conditions, lessen danger of accidents and increase production efficiency.

GREATER EFFICIENCY . . . fewer time-loss accidents . . . better industrial relations! These important benefits result from the use of Pittsburgh COLOR DYNAMICS in the hot and cold strip mills of the Detroit Steel Corporation, in Portsmouth, Ohio.

● **This large plant** was recently painted as part of a huge sixty million dollar expansion and modernization program. The rated output of these mills is in excess of a million tons annually.

● **"We turned to Pittsburgh** COLOR DYNAMICS to improve working conditions in this mill," states H. E. Baughman, Vice-President in charge of the Portsmouth division. "We believe that the kind of job a worker turns out often reflects his environment.

● **"By painting according** to the principles of COLOR DYNAMICS, we have given our employees pleasant surroundings. By using color purposefully, we have also reduced eye fatigue which so often leads to physical fatigue. This has resulted in more efficient performance. At the same time it has decreased danger of time-loss accidents.

● **"Our workers take pride** in their new surroundings. They help to keep them clean and orderly, simplifying housekeeping. These new surroundings have also helped to improve relations between our workers and management.

● **"From every standpoint,** we are confident that Pittsburgh COLOR DYNAMICS has created a helpful condition throughout our entire operation."

COLOR DYNAMICS Engineering Study Of Your Plant — FREE!

● To paint your plant with COLOR DYNAMICS costs no more than a conventional maintenance job. Why not try it on a machine or two—or in an entire department—and discover how it will improve efficiency, morale and safety.

● Send for *free* book on COLOR DYNAMICS. Better still, call your nearest Pittsburgh Plate Glass Company branch and ask to have a representative give you a color engineering study without cost or obligation. Or mail this coupon.

SEND FOR A COPY OF THIS BOOK→

Pittsburgh Plate Glass Co.,
Paint Div., Dept. FM&M-53
Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet, "*Color Dynamics.*"

☐ Please have your representative call for a Color Dynamics Survey without obligation on our part.

*Name*_____

*Street*_____

*City*_____ *County*_____ *State*_____

PITTSBURGH PAINTS

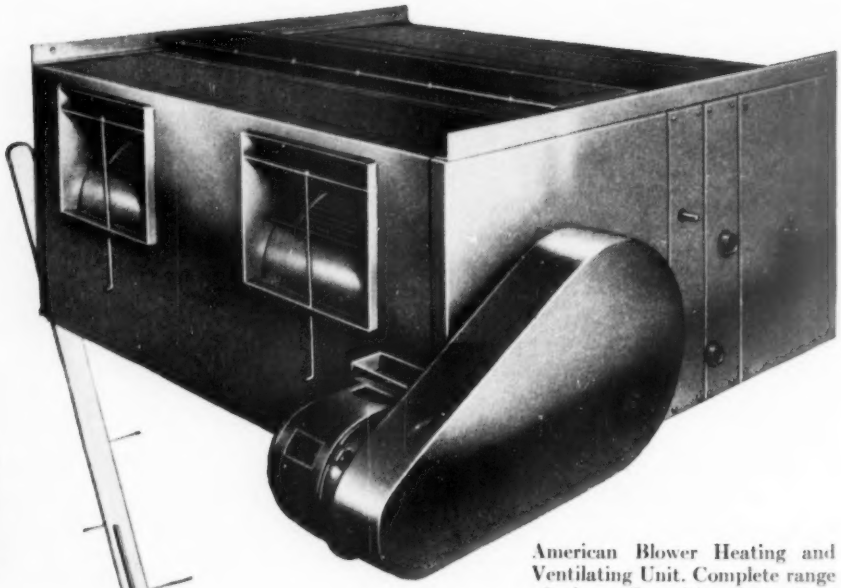
PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES, LIMITED

Copr. 1953, Pittsburgh Plate Glass Co. *Trade Mark Registered

American Blower *Heating and Ventilating Units*



American Blower Heating and Ventilating Unit. Complete range of sizes. Capacities from 1000 to 33,000 cfm and 45,000 to 2,500,000 BTU/hr.

That delightfully fresh, pleasant atmosphere which works wonders for employee morale, working and selling conditions, is assured when American Blower Heating and Ventilating Units are installed.

These dependable units, with slow-speed centrifugal fans, are available in a wide range of sizes for wall, horizontal, inverted and floor installation. Each fan housing is equipped with Aileron control. Humidifiers, face and by-pass dampers, filter boxes and mixing boxes are available.

Investigate these efficient Heating and Ventilating Units *now*. Call your nearest American Blower Branch Office for data.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICH.
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONT.
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER
YOUR BEST BUY IN AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS

4 good men on a 1-man job

Three aren't helping much on this valve repair job. They're a good molding press crew with nothing to do because a valve failed. But their time and production loss is raising the cost of this valve mighty high.

Here's one of the reasons for insisting on dependable quality in every valve, no matter how obscure, how seldom operated. Here's where production tallies, as well as maintenance reports, can show the fallacy of buying valves on price alone.

The thrifty buyer knows the risk of sacrificing quality in face of mounting labor costs. He's aware how even brief shutdowns can multiply those high costs fast. He chooses Crane Quality for the assurance it gives of dependability and value in all piping equipment.

Crane Co., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas.

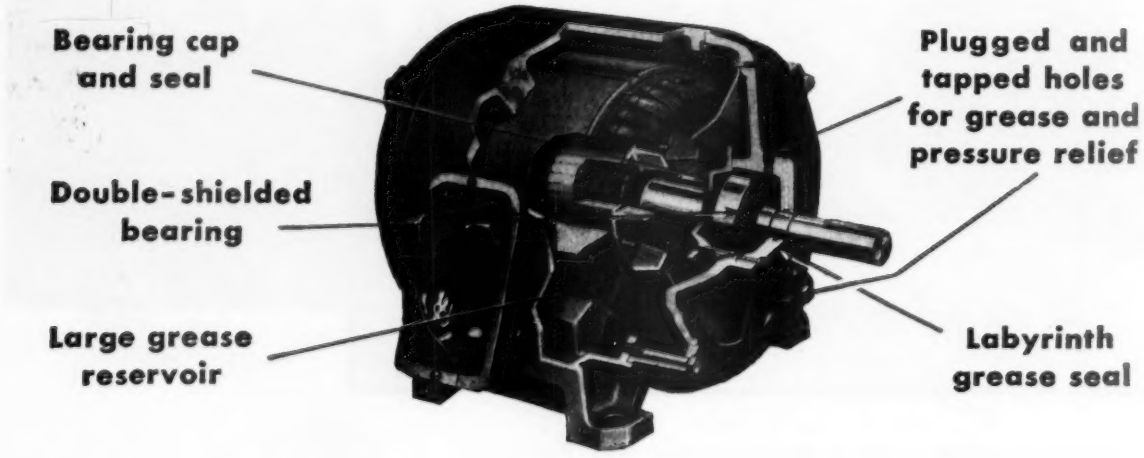
CRANE

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Here Are Facts You Should Know About Electric Motor Bearings

An ideal motor bearing would operate for indefinitely long periods under all types of conditions without requiring any attention whatever. However, in the opinion of our engineers, such a bearing and its attendant lubricant are not yet available on the commercial market. Consequently, bearings for many types of operations, particularly where overloading, extreme temperature ranges and chemical and dirt laden atmospheres are involved, require special lubricants or regular lubrication schedules.

Of course, bearings suitable for many kinds of operation under normal conditions can be built to require no attention for very long periods — usually several years. Allis-Chalmers can supply sealed bearings in all frame sizes through 505 on short delivery and without extra cost for applications of this type.


Bearing cap and seal
Double-shielded bearing
Large grease reservoir
Plugged and tapped holes for grease and pressure relief
Labyrinth grease seal

Which is the Best Design for *Your* Application?

But, we believe that the design used in standard Allis-Chalmers drip-proof, tefc and explosion-proof motors represents the best design for most industrial users.

The Allis-Chalmers standard design consists of a prelubricated, double-shielded bearing mounted in the end housing with a generous grease reservoir. Plugged and tapped holes are provided for grease and for pressure relief. Under normal operating conditions, this design will operate as long without attention as any other type of bearing in use today. But where difficult operating conditions make relubrication desirable, it can be done as part of the normal lubricating-routine without dismantling the motor.

The large grease reservoir and shielded bearing design assure that grease lost from the bearing due to high operating temperatures or other causes will be replaced automatically.

For further information on bearing design and other features of Allis-Chalmers motors, call your nearby Allis-Chalmers District Office or Authorized Distributor. A-4130

ALLIS-CHALMERS

When figuring your maintenance painting, never put the *price* before the *cost*. It can ruin you. The price of the paint is only one fourth the cost of putting the paint on the wall. And when it comes to cutting on-the-wall costs, that's where Barreled Sunlight shines.

True, the price of Barreled Sunlight might run a few extra pennies per gallon. But that slight premium pays handsome dividends on the over-all cost of the job.

To begin with, you can use more thinner with Barreled Sunlight . . . as much as one gallon of thinner to every five gallons of paint. You buy less paint . . . and so cut your material costs. And of even greater importance (because labor represents 80% of the total cost of painting), Barreled Sunlight cuts your labor costs, too. It goes on faster . . . *much* faster. It hides better in fewer coats. It gives more yardage per gallon. It stays brighter, cleaner longer. It saves, in many cases, enough on labor to pay for the cost of the paint.

Before your next maintenance painting job, talk with one of our representatives. Talk "cost vs. price" with him and see how much Barreled Sunlight can save for you. Write and he'll call.

BARRELED SUNLIGHT PAINT COMPANY
2-H Dudley St., Providence, R. I.

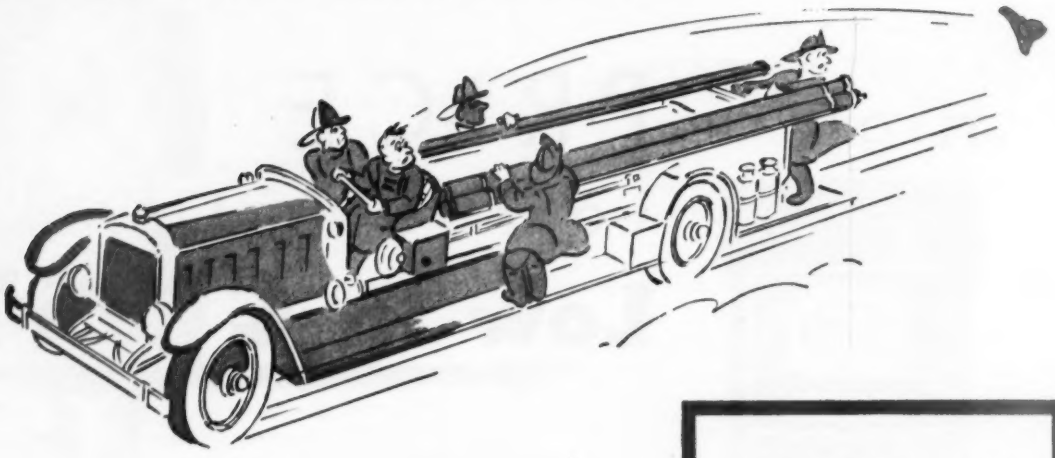
Barreled Sunlight®
Paints

In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

IT ALWAYS COSTS MORE NOT TO PAINT!

For over half a century those who know the best in paints . . . for all types of buildings . . . have strongly insisted on famous Barreled Sunlight

NO TIME FOR INTERRUPTION



De Laval Centrifugal Separators and Clarifiers speed up industrial processes by making them ***continuous.*** When they replace gravity or other less efficient methods of separating two liquids or removing solids from one or two liquids, these De Laval machines quickly relieve the "bottleneck" of a process.

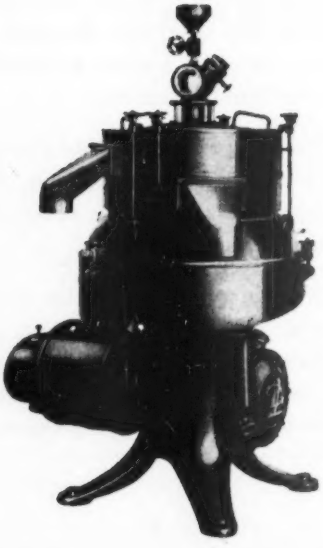
Many things influence the type of centrifuge needed. Specific gravity, viscosity of the liquids, the kind and quantity of solids present . . . all enter into the choice of machine. But whatever the factor or combination of factors, there is a particular De Laval Separator or Clarifier to meet the requirements, and do the job most efficiently.

Consult a De Laval engineer for the right centrifuge for you.

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

Why De Laval?

De Laval has over 70 years' experience in solving problems of separation and clarification. Your problem may be quite similar to one that has already been solved by De Laval centrifugals. It will pay you to ask.



De Laval

FOR FASTER PROCESSING SYSTEMS

Up until about 20 years ago, assembly with slotted screws was one of the slave jobs of industry . . . hit or miss, slip and slash, nerve-racking to workers and often destructive to work.

Then American gave industry the Phillips Cross-Recessed Head Screw, with screw and power-driver aligning themselves *automatically* into a single straight-driving unit. Right then and there the drudgery ended, production increased (often as much as 50%), while work-spoilage dropped to the vanishing point. And those who have adopted this modern fastening method find that *American Phillips Screws always cost least to use.* American engineers will prove this to you, on your own assemblies, any time you [illegible].

SINCE 1838

AMERICAN SCREW COMPANY

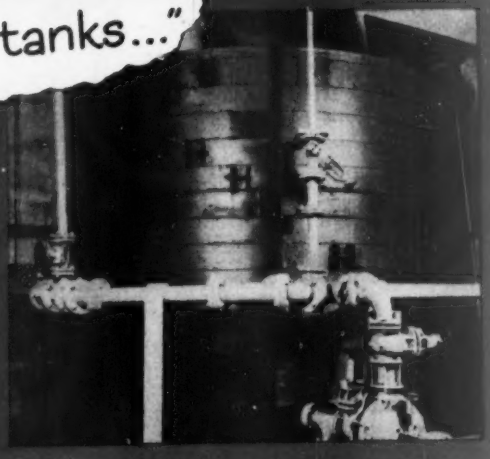
PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.

Parlon Stays On!

"The paint for storage tanks..."



WOOD vs. FERRIC CHLORIDE. To the right is one of two 3500-gallon ferric chloride storage tanks at the Vacuum Filter Plant, South River Sewage Works, Baltimore, Md. This chemical is used to release moisture from the sludge before it goes into the vacuum filter. The tank is made of wood, with a rubber liner. Outside finish consists of three coats of red Rubcote RA paint based on Parlon, made by Alfred Hague & Company, Brooklyn, N. Y. This paint is the only one found to date which can withstand ferric chloride—a chemical so strong that it will quickly eat away bare metal or concrete.

METAL vs. SALT WATER. The oil storage tank shown above, belonging to Diesel Oil Sales Company, Seattle, Washington, is painted with a green Parlon-based finish, two coats. After two years of exposure in a location almost right on a salt-water bay, the finish is still like new. Paroil paint based on Parlon made by Pecro Paint Company, a subsidiary of Rudd Paint & Varnish Co., Seattle, Wash.

CONCRETE vs. ALUM. Concrete tank (left) in Water Filter Plant, Celanese Corporation of America, Belvidere Plant, is painted with Torex enamel based on Parlon. Alum solution in the tank was eating through concrete and loosening mortar in the brick wall prior to application of Torex enamel. This Parlon-based finish has now been on the tank nine months. It is in excellent condition, and has substantially simplified and speeded maintenance procedures. Torex enamel, based on Parlon, is made by Inertol Co., Inc., Newark, N. J.

From coast to coast, the modern and easiest way to give lasting protection to storage tanks is with paints made from Hercules Parlon (chlorinated rubber). For most maintenance men, it's *the* paint to use, and for many good reasons. It goes on easily... metal, concrete, wood. It dries faster and lasts much longer than the majority of other maintenance paints. In its price range, no finish can equal Parlon for exterior protection, and few can surpass it where there's direct contact with corrosive liquids inside storage tanks.

Wherever corrosion is a problem . . . especially in chemical plants, refineries, paper and textile mills, sewage disposal plants and water works, ships, railroad tank and freight cars . . . Parlon gives better service at lower long-term costs. See your paint supplier for details on Parlon-based chlorinated rubber paints, or write:

Cellulose Products Dept. HERCULES POWDER COMPANY *968 Market St., Wilmington 99, Del.*

LOOK FOR THIS LABEL ON THE PAINT CAN...

MADE WITH Parlon® HERCULES® CHLORINATED RUBBER

PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER THEIR OWN BRAND NAMES

TOWMOTORS IN ACTION IN U. S. INDUSTRY

Towmotor dumps pot of annealed castings into shakeout hopper at Cleveland plant of Eberhard Manufacturing Co.

BOTTOMS UP!

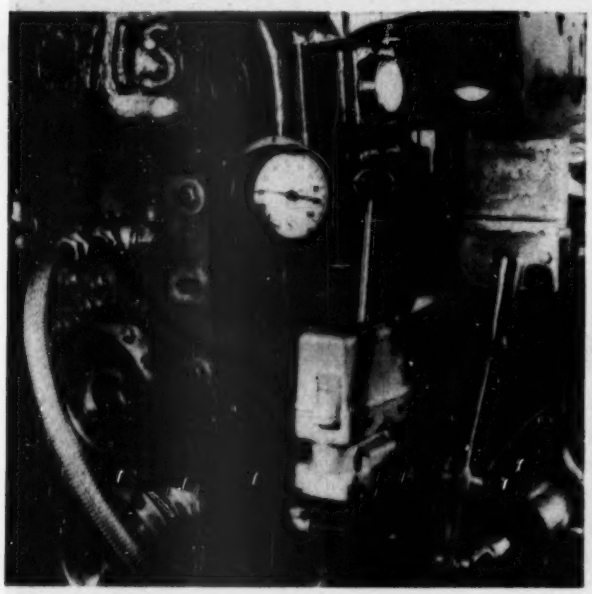
Here's to TOWMOTOR, the fast and economical way of handling materials! Easy, too, because TOWMOTOR Power Steering reduces steering effort 80%! And speaking of power, the new "Cushioned Power" Diesels are as gentle and economical as ponies—with all the terrific strength of wild horses! There are dozens of other features that make special jobs like the one above, mere routine, and make *your* job twice as important to the boss. Send today for free booklet, "What Makes It Tick?" TOWMOTOR CORPORATION, Div. 508, 1226 East 152nd Street, Cleveland 10, Ohio.

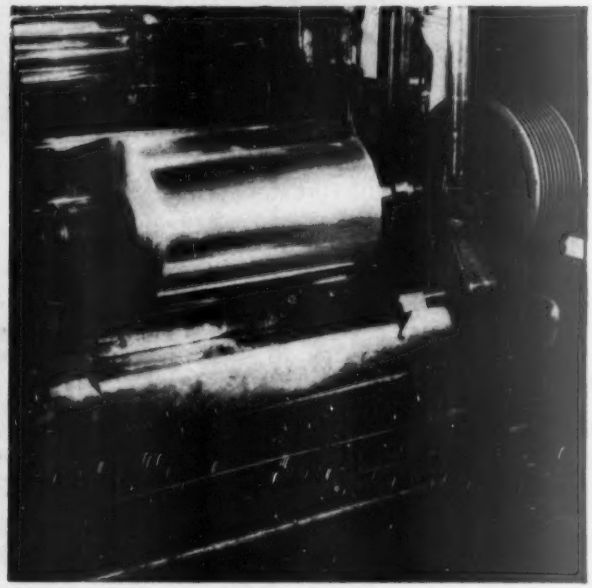
TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS AND TRACTORS
Since 1919

TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE

Compressed air is used to regulate the tension of aluminum foil being rolled on this mill at the Baltimore plant of Crown Cork and Seal Company. Previously, manual control was used, but it was not accurate enough and caused production delays while adjustments were made. Pneumatic control has boosted production about 15%.

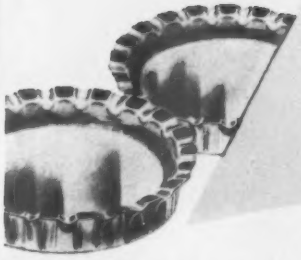




This simple valve . . . controls the tension of this feed roll

Tension is regulated by a pneumatic brake applied to the feed roll. Air pressure determines the amount of braking and is controlled by a Westinghouse Flexair® Valve. Once set, this valve automatically maintains the selected air pressure. The operator can position the valve just by moving his thumb. The great accuracy of this simple control enables Crown Cork and Seal Company to obtain a final thickness within plus or minus 10% of gauge. Scrap losses have been reduced 2% which quickly paid for the cost of the pneumatic control system.

Let AIR do the work



Three air valves, some pipe, and three brakes save 40,000 lbs. of aluminum a year

• You know those little protective discs of aluminum foil under many "Crown" bottle caps? At the big Baltimore, Maryland, plant of Crown Cork and Seal Company, the world's largest manufacturer of these caps, they roll and punch 2,000,000 lbs. of aluminum foil a year just to supply those discs.

It's precision rolling too. With a tolerance of only 1/10,000" on the final thickness. To maintain this hair-splitting accuracy, pneumatic tension control has been installed on all of Crown Cork and Seal Company's rolling mills. It replaces manual control.

Off-size scrap losses have been reduced at least 2%; that's 40,000 lbs. of aluminum a year. At the present price of foil, this saves *$18,000*—several times more than the cost of the pneumatic systems. In addition, production has been stepped up about 15%.

This simple pneumatic system, built around Westinghouse Air Brake controls, *automatically maintains* the correct air pressure. It has been operating 16 to 20 hours a day for the past year, and has proved to be completely reliable.

Our experienced engineers will be glad to help you design a pneumatic control system for your equipment. Just drop us a line.

Westinghouse Air Brake COMPANY

INDUSTRIAL PRODUCTS DIVISION **WILMERDING, PENNA.**

Factory Branch: Emeryville, Calif.
In Canada: Canadian Westinghouse Co. Ltd., Hamilton, Ontario

Where to use

WESTINGHOUSE FLEXAIR® VALVES

There is a popular family of Flexair® Valves from which you can pick your requirements for pressure control. Along with their companion Control-air® Valves, they provide control of air pressure for pneumatic cylinders, actuators, clutches, and brakes. Combined with other Westinghouse pneumatic equipment they simplify control and speed up operation of diesel engines, hoists, cranes, and production machines.

We make an extensive line of industrial air compressors, cylinders, valves, chokes, filters, and other pneumatic devices.

1879 75 1953
YEARS OF ELECTRICAL PROGRESS

ONE OF FIVE 2000-HP G-E SYNCHRONOUS MOTORS USED FOR AIR-COMPRESSOR DRIVES AT FORD MOTOR CO., ROUGE PLANT.

FOUR REASONS WHY G-E SYNCHRONOUS MOTORS

1. STRONG, FABRICATED FRAMES . . .

The welded steel-plate stator frame provides maximum rigidity in a comparatively lightweight construction. The sturdy channel-shaped frame consists of a wrapper plate firmly secured by continuous welds to rigid side plates. This design, proved by years of operating experience, affords more than ample strength for clamping and supporting the stator core.

2. G-E BRUSHES ON G-E MOTORS . . .

Brushes on G-E synchronous motors are a product of G-E teamwork. Close co-operation between machine designers and laboratory engineers means you get the right brush on the right motor for your particular application. In addition to extensive research and testing, all new and improved grades of brushes are thoroughly field-tested before approved for standard use.

Dependable G-E Synchronous Motors on 24-Hour Assembly-line Service

Ford Motor Company uses G-E synchronous motors for air-compressor drives

Compressor-motor dependability is really put to test on 'round-the-clock service at Ford Motor Company's Rouge plant. Compressed air is used 24 hours a day on many assembly operations, and a dependable supply is vital to keep production lines moving.

To furnish this all-important air, five 2000-hp G-E synchronous motors drive reciprocating compressors continuously—with only slight reductions in demand on certain shifts.

G-E synchronous motors can be relied upon for such continuous service with minimum downtime. You can depend on them because in back of every G-E synchronous motor stand more than half a century of motor engineering leadership . . . superior research and testing facilities to assure excellent component materials . . . and a corps of experienced craftsmen who are proud of the equipment they build—and build it to last.

The next time you consider a drive for heavy, continuous-service equipment be sure to call in your G-E representative to discuss any special application problem you may have. Have him explain the many money-saving uses for G-E synchronous motors and point out their operating economies.

In the meantime, you can obtain more information on G-E synchronous motors by writing for these publications: GEA-5332, "Low-speed Synchronous Motors," or GEA-5426, "High-speed Synchronous Motors." Write to Section 770-29, General Electric Co., Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

GIVE LONG, DEPENDABLE SERVICE . . .

3. LONG INSULATION LIFE . . .

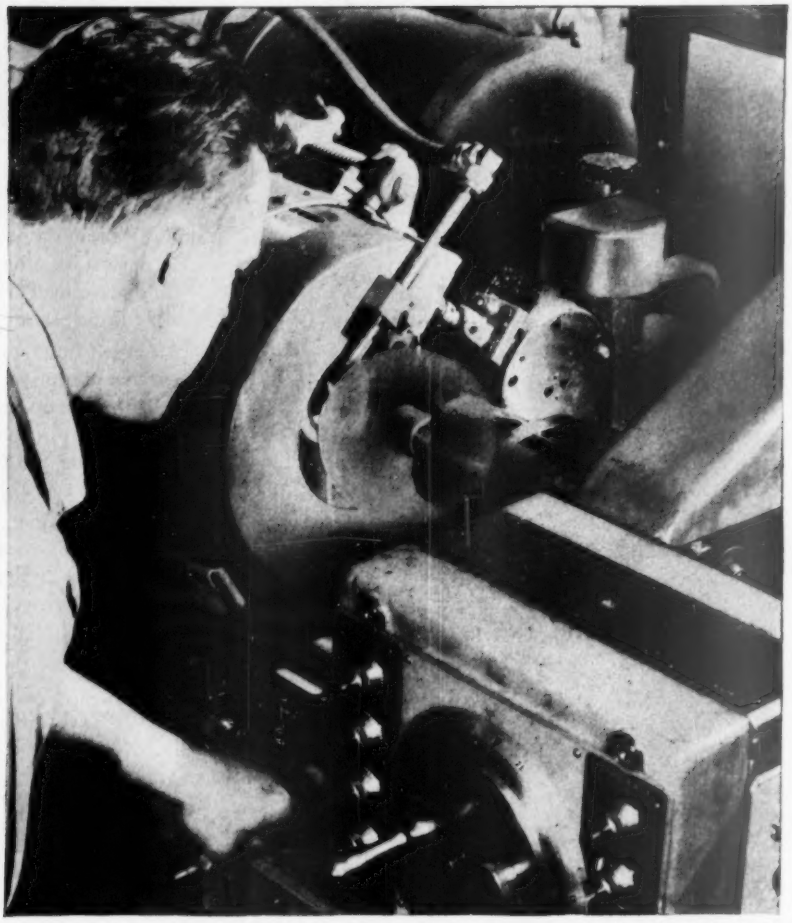
Insulating materials, manufactured in our own factories by the most modern methods, conform to rigid G-E specifications and are applied by experienced operators, above. Thus coils are uniform, interchangeable, mechanically rugged, and moisture resisting.

4. LOW-RESISTANCE CONNECTIONS . . .

For dependable operation, stator windings are silver brazed, as shown above. Joints of this type have low electrical resistance, exceptional thermal and mechanical strength. These important properties are difficult to obtain by other methods.

Step up your internal grinding... boost your profits ...with this new

"TOUCH OF GOLD"



High production hits its peak when the "Touch of Gold" is added with Norton G Bond wheels for internal grinding.

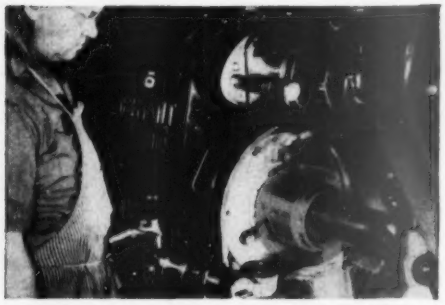
Norton G BOND wheels are precision-processed for identical precision-performance

Built by Norton's exclusive *precision-processing,* the new Norton G Bond wheels for internal grinding are completely uniform in structure. Just pull off a worn out wheel and slip on a new one — and you'll get exactly the same grinding action every time. Eliminating the fussing with the timing cycle, they save you time and money on every job.

Added to this, the new Norton G Bond, designed for precision and semi-precision grinding, is one of the greatest advancements in vitrified bonds ever made. Holding each abrasive grain for maximum cutting action, it assures a constant grinding surface of fresh, sharp cutting edges. As a result, G Bond wheels cut cooler . . . remove material faster . . . produce a better finish . . . produce more pieces per dressing . . . hold their shape better.

Thoroughly job-proved. Typical reports from internal grinding customers after switching to G Bond wheels: *Total pieces per wheel jumped from 200 to 400... Twice as many roller bearing races ground per dressing . . . Grinding cycle reduced from 7/10 minute to 4/10 minute ...Pieces per dressing increased from 9 to 15.*

Precision-processed for identical top performance, Norton G Bond wheels help cut costs on this centerless internal grinding job.



A faster, *better* finish on this aircraft engine cylinder is assured. Norton G Bond internal grinding wheels are on the job!

W—1507

See your Norton distributor for further facts on this value-adding, profit-boosting "Touch of Gold" for your internal grinding. He'll gladly arrange a test in your plant. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities — see your telephone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES
Making better products... to make other products better

WHY IT PAYS TO BUY STEEL FROM WAREHOUSE

You don't waste costly time rehandling steel stocks!

- LOWER INVENTORY COSTS
- LOWER SPACE COSTS
- LOWER TIME COSTS
- LOWER CAPITAL INVESTMENT
- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

UNLOADING and distributing bulk shipments of steel to storage area and then to production and job sites demand added time, manpower and equipment. Eliminate these added costs by letting U. S. Steel Supply deliver your steel to the spot, in the condition and at the time you need it. Fifteen warehouses with the most modern steel handling and delivery equipment assure your complete satisfaction.

U. S. STEEL SUPPLY

DIVISION

General Office
208 So. La Salle St., Chicago 4, Ill.

USS

Warehouses and Sales Offices Coast to Coast

UNITED STATES STEEL

LIGHT, VERSATILE, RUGGED DELTA TOOLS lead new trend in Metalworking

There's a basic change going on in the metalworking industry—a wholesome, profitable change, with the pace increasing daily—as alert shop men discover that on many operations light, rugged, versatile Delta power tools can out-perform and out-produce heavier, costlier installations.

These five potent facts go far toward explaining the economic common sense of this change:

DELTA TOOLS ARE ACCURATE—their accuracy is built in, makes close precision tolerances easy to achieve.

DELTA TOOLS ARE ADAPTABLE—unusually mobile and portable, they can be tooled for a given job, kept in the tool crib, then moved into and out of production lines with no lost time for setting up; can be used for continuous high-production runs of single or multiple operations.

DELTA TOOLS ARE DURABLE—rugged to withstand hard usage . . . precision built and beautifully balanced, they perform most efficiently throughout long, useful lives.

DELTA TOOLS ARE ECONOMICAL—first cost is moderate; and is quickly amortized by low power cost, low maintenance expense, increased output and elimination of bottlenecks and slower methods.

Dollar for dollar, Delta tools deliver more. Here are 5 reasons why:

1. Lubricated-for-life ball bearings eliminate lubrication problems.
2. Precision bored bearing seats assure accuracy and smooth operation.
3. Preloaded bearings provide maximum rigidity and accuracy under load.
4. All spindles, arbors and collars are precision ground for accuracy.
5. Dynamic balance of rotating parts insures smooth, true performance.

DRILL PRESSES

With Delta Drill Presses, you can work out any set-up to suit your own need—using one spindle or as many as your job requires. Any set-up you want is not merely possible, but is actually very easy—because Delta drill presses have the flexibility to make them fit readily into any multiple spindle set-up. Low in cost, easy to maintain, readily portable, the Delta Drill Press is a good example of fine engineering, rugged construction and compact design.

A 14" DRILL PRESS

Available with either No. 1 Morse taper spindle or Jacobs chuck that takes straight shank drills from No. 60 to full ½-inch. In high- or slow-speed models. Capacities up to ½-inch in cast iron; ⅜-inch in steel. Quill has 4-inch stroke. Spindles are readily interchangeable—a simple matter to select the right spindle for any job.

B 17" DRILL PRESS

Available with either No. 2 Morse taper spindle or ½-inch Jacobs chuck. In high- or slow-speed models. Capacities up to ¾-inch in cast iron. Quill has 5-inch stroke.

METAL CUTTING

C CUT-OFF MACHINE

Cut steel, aluminum, copper, brass in one fast, easy motion with a Delta Cut-Off Machine. It's easily changed from a non-ferrous to a ferrous cut-off machine by switching from steel blade to abrasive wheel.

D 14" METAL CUTTING BAND SAW

Cuts anything from carbon tool steel to asbestos, in hundreds of applications. Four metal-cutting speeds: 125, 175, 250, 340 f.p.m.—change from metal to wood with just a flip of your finger and simple belt change.

SHAPER

E 7" PRECISION METAL SHAPER

This husky "machine of a thousand uses" is extremely popular in machine shops, tool making and model making shops, schools and experimental departments. "V"-type ways on ram, tool head and front face of main frame insure accuracy and longer life.

FINISHING MACHINES

F DEBURRING Machine

The easy, practical, low-cost way to handle a multitude of metal removal operations. Eliminates bother of "set-up wheels" and dressing of "grinding wheels"—inexpensive, long-wearing abrasive belts are easily replaceable. Much lower in cost than any comparable machine on the market.

G ABRASIVE BELT FINISHING Machine

This 6" belt-type abrasive finishing machine is heavy and husky enough to do dozens of sanding, polishing and finishing operations, yet is portable. Operates vertically or horizontally.

H ABRASIVE DISK FINISHING Machine

This machine is ideal for an accurate, fast finishing job. It can be moved to any place in the shop or on the production line. Abrasive disks can be renewed every few minutes if necessary.

WELDERS

I DELTA Combination 5 KVA SPOT and 120 AMP. ARC WELDER

For any shop doing a lot of light duty production spot welding and intermittent arc welding. Unique design, careful engineering and high production methods permit pricing it considerably under two individual welders.

J DELTA 5 KVA Automatic SPOT WELDER

Compared to other spot welders, this compact unit is conspicuous for efficiency and low cost. It is extremely simple and easy to operate, and has an unusually wide range of capacity.

GRINDERS

K Toolmaker GRINDER

As a Chip-Breaker Grinder. With univise and coolant attachment, the Toolmaker surface grinder is a precision machine which grinds the chip breaker groove in carbide tipped tools.

As a Tool and Cutter Grinder. With the Toolmaker tool and cutter grinding attachment, it becomes an economical machine for easy sharpening of tools and cutters.

As a Standard Surface Grinder. The basic Delta Toolmaker surface grinder does every type of surface grinding required in the tool room or production shop. It's a big, rugged machine with the massiveness and solidity needed to produce accurate work.

L CARBIDE TOOL GRINDER

Here's the accurate, low cost way to grind your tungsten-carbide tools—the Delta Carbide Tool Grinder. Made in two styles—bench and pedestal—a wide range of motors are available.

M STANDARD TOOL GRINDER

Here's the grinder "that can't forget its goggles." In addition to its unsurpassed safety features, it's a money-saver—sturdy, accurate, highly adaptable, easy to use and low in cost.

There's a Delta Power Tool for Your Job - WOOD OR METAL WORKING 53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

DELTA MILWAUKEE

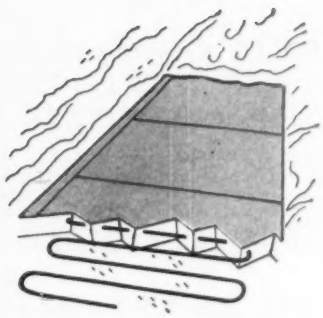
DELTA POWER TOOL DIVISION

Rockwell Manufacturing Company

628H North Lexington Avenue • Pittsburgh 8, Pa.

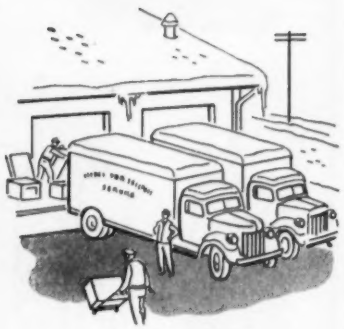
Now is the time to install a snow-melting system with SPANG® CW STEEL PIPE

1. This is the old unsatisfactory way to remove snow. With it goes the danger of injury through straining and over-exertion . . . or accident claims resulting from falls on improperly cleared walks . . . or delays and inconveniences to customers.



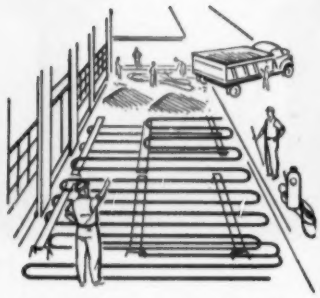
2. But a modern snow-melting system with SPANG CW Steel Pipe saves labor costs on snow removal, eliminates the need for chemicals, ashes or sand and avoids accident hazards. It's easy to install, and everybody benefits. For instance . . .

3. It eliminates caked snow or icy spots on areas in front of stores, airports, clubs, hotels, office buildings, and apartments—a real service which customers and tenants appreciate.



4. Driveways, loading platforms, service station drives and garage entrances are accessible all year around regardless of weather—no delays on deliveries or customer service.

5. In residential areas, too, a snow-melting system eliminates a tiring chore, and keeps driveways, walks and steps clear in any weather from a light snowfall or ice storm to a blizzard.



6. Snow-melting systems with SPANG CW Steel Pipe to meet your local winter weather conditions can be tied in with an existing heating system or as an independent installation.

Don't Put it Off!

Now, while the weather is warm, is the time to install a snow-melting system with SPANG CW Steel Pipe. Spang Pipe is quality-controlled in manufacture, which makes it easy to cut, bend, thread and weld . . . saves installation time and assures years of dependable and trouble-free service.

Your local Spang distributor carries a complete line of Spang Pipe and fittings. See him for all your piping needs.

SPANG-CHALFANT

DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Pittsburgh 30, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

34 years experience stands behind these products . . . it's all yours when you specify *Acme* air conditioning and refrigeration equipment

Since 1919 Acme has been building units to serve air conditioning and refrigeration fields. During that time they have experimented with thousands of models and installations. On-the-job and in-the-field service has always been the criterion for any design changes Acme makes. Today, Acme has this complete line of commercial refrigeration and air conditioning equipment — the end result of 34 years experience. You gain all this experience for yourself and your customer by the simple act of specifying Acme on your next installation.

DRY-EX* Water Chiller

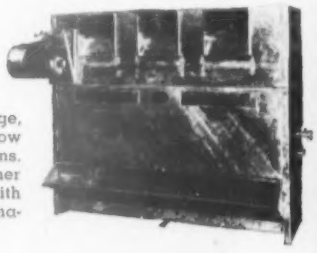
More than 700 combinations from which to choose, assuring you of the most efficient chiller operation obtainable. Capacities from 5 to 260 tons.

ACME Condensers

More than 120 models and standard sizes of Freon and Ammonia shell and tube and shell and coil types. Capacities from 5 to 700 tons.

BLO-COLD* Industrial Unit Cooler

For vegetable storage, packing plants and low temperature installations. 5 distinct series for either Freon or Ammonia with more than 260 combinations.



ACME Evaporative Condensers

For Freon or Ammonia. More than 30 models from which to choose. Your choice of copper or steel coils. Completely hot-dipped galvanized after fabrication. Capacities from 4 to 130 tons.

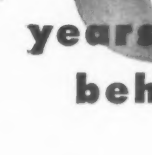
ACT Cooling Tower

All metal, hot dipped galvanized induced draft cooling tower. Available with exclusive Acme snug fitting pump for all 16 models. Capacities from 8 to 60 tons.

FLOW-COLD* Packaged Liquid Chiller

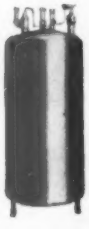
A pre-tested liquid chilling unit shipped ready for installation. Matched Acme components for systems of 2 to 15 tons.

Addition of the Acme change over valve results in the Flow-Temp heat pump. A complete heating and cooling system in one compact package.



FLOW-COLD* Remote Room Conditioner

Designed for the modern recirculated hot or cold water air conditioning systems. Whisper quiet operation with variable air recirculation permits efficient individual zone control.



HI-PEAK* Water Cooler

Seven standard sizes providing large storage capacity and all non-ferrous surfaces in contact with the water.

ACME JCT Cooling Towers

Available for use where compactness counts. An all metal tower completely galvanized for long life. Capacities from 3 to 10 tons.

ACME Liquid Receivers

More than 70 standard sizes for Freon, Ammonia, or other refrigerants.

ACME Oil Separators

A complete line of Freon or Ammonia Separators for 1/4 to 100 ton systems.

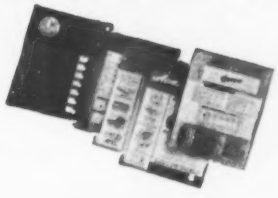
ACME Heat Exchangers

A complete line of compact, efficient Freon Suction and liquid line heat exchangers. Capacities from 3 to 200 tons.

*Trade Mark

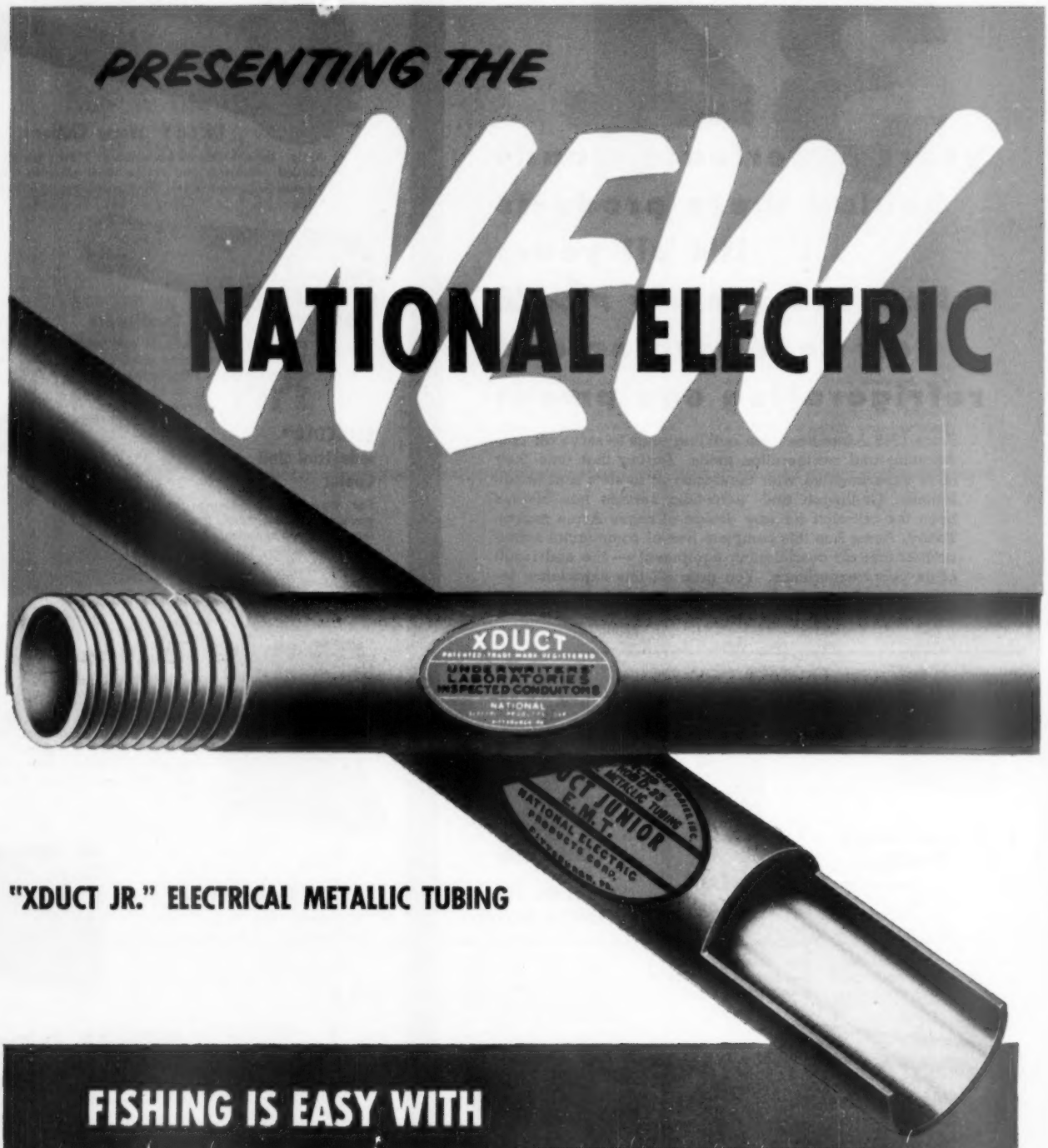
SERVING THE REFRIGERATION AND AIR CONDITIONING INDUSTRY SINCE 1919

* *Write for catalogs on any of the products listed.*



ACME INDUSTRIES, INC.

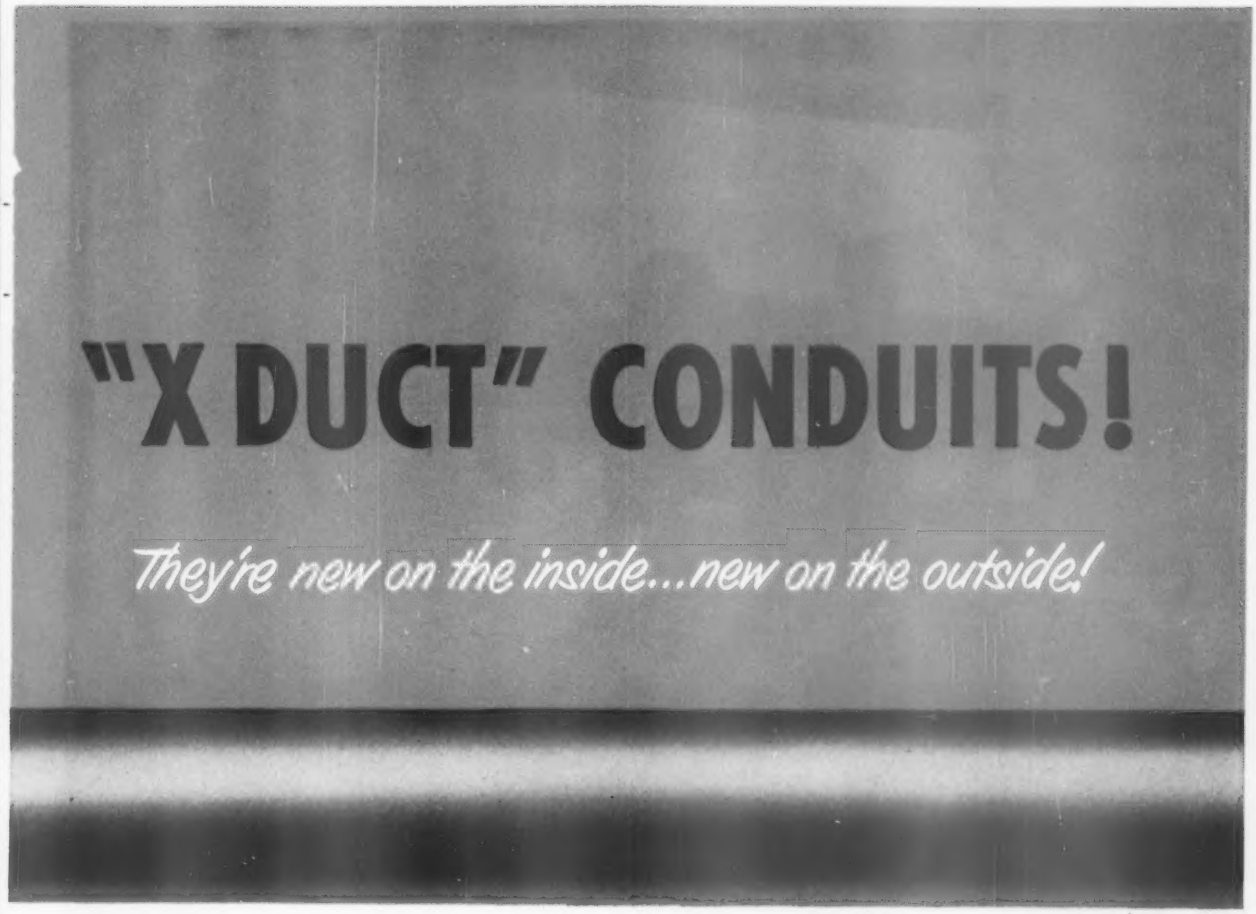
JACKSON, MICHIGAN



FISHING IS EASY WITH

"X DUCT" CONDUIT

Proved best by actual fish test!



"XDUCT" RIGID STEEL THREADED CONDUIT

Here's what these new conduits mean to you!

1. **EASY FISHING**—"XDuct's" new aluminum enamel inside coating (patent applied for) was developed through intensive research in connection with important government projects. It provides lubrication as friction builds up between conduit wall and wires. The result: Actual fishing tests conducted with five other leading brands of conduit prove "XDuct" is 66% easier to fish on constant pull—more than twice as easy to start as the second best conduit.

2. **SUPERIOR CORROSION RESISTANCE**—National Electric's revolutionary new patented electrogalvanizing process electrolytically deposits pure zinc *uniformly* over the entire outside surface of "XDuct" conduit, including the threads. The result: a protective coating that adheres positively to the basic steel . . . possesses superior corrosion resisting qualities.

3. **THREAD PROTECTION**—Sharp, clean threads of "XDuct" rigid steel conduit are machined *before* galvanizing to assure complete protection from end to end. The result: every hill and valley of threads are completely galvanized.

4. **SUPERIOR BENDING**—High-ductile steel is used to assure easy bending.

5. **DESIRABLE COLOR**—"XDuct's" silvery color is highly acceptable for installation in exposed locations.

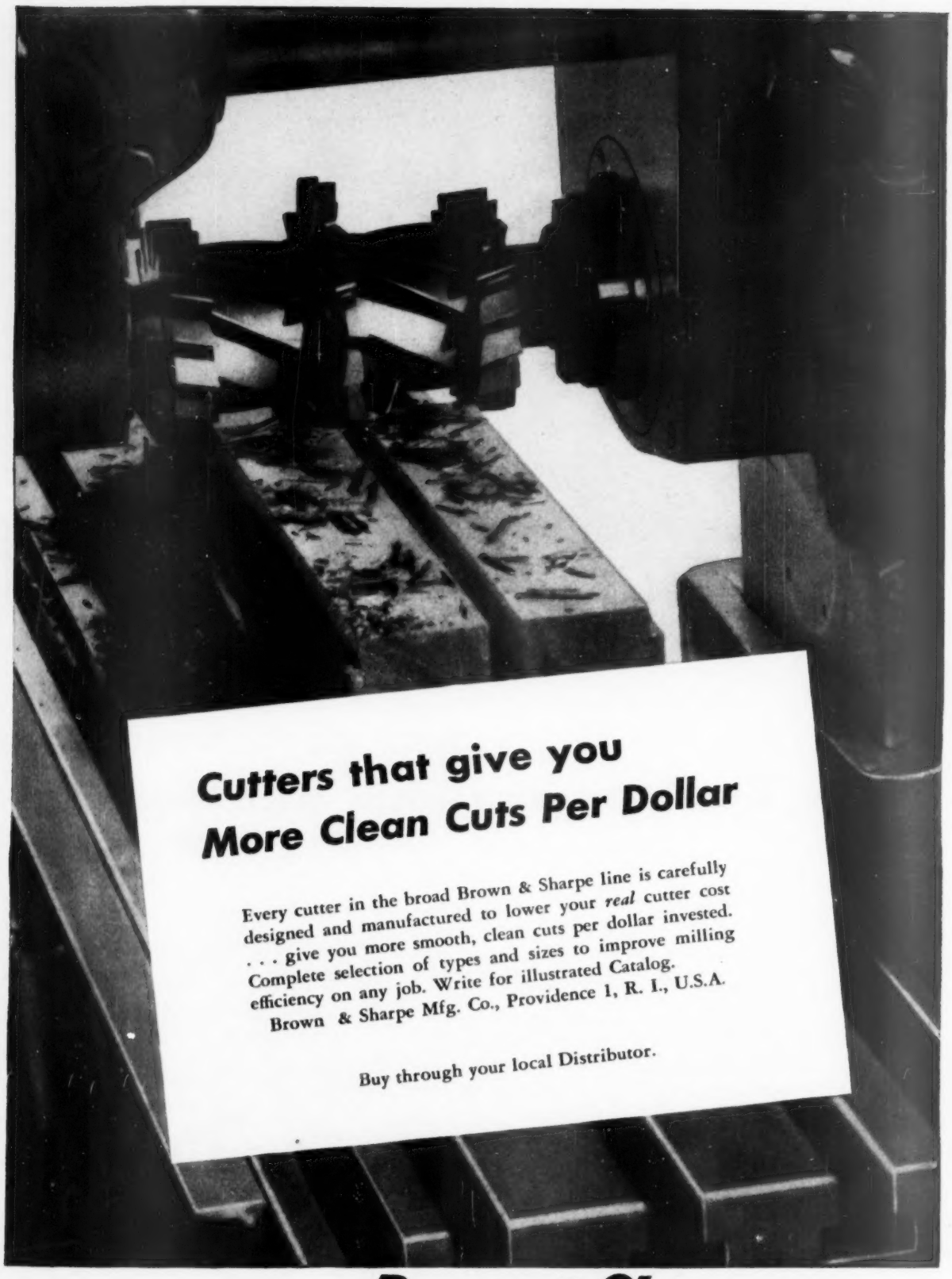
EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 Plants • 7 Warehouses • 34 Sales Offices

LISTED BY UNDERWRITERS' LABORATORIES, INC. • STOCKED BY LEADING ELECTRICAL WHOLESALERS EVERYWHERE



Cutters that give you More Clean Cuts Per Dollar

Every cutter in the broad Brown & Sharpe line is carefully designed and manufactured to lower your *real* cutter cost . . . give you more smooth, clean cuts per dollar invested. Complete selection of types and sizes to improve milling efficiency on any job. Write for illustrated Catalog.
Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Buy through your local Distributor.

Brown & Sharpe B·S

for BIG volume pumping?

You get a new high in service from Fairbanks-Morse *Angleflow* Pumps. They're designed for BIG volume pumping against moderate heads — sizes range from 8 to 54 inches . . . capacities up to 80,000 GPM.

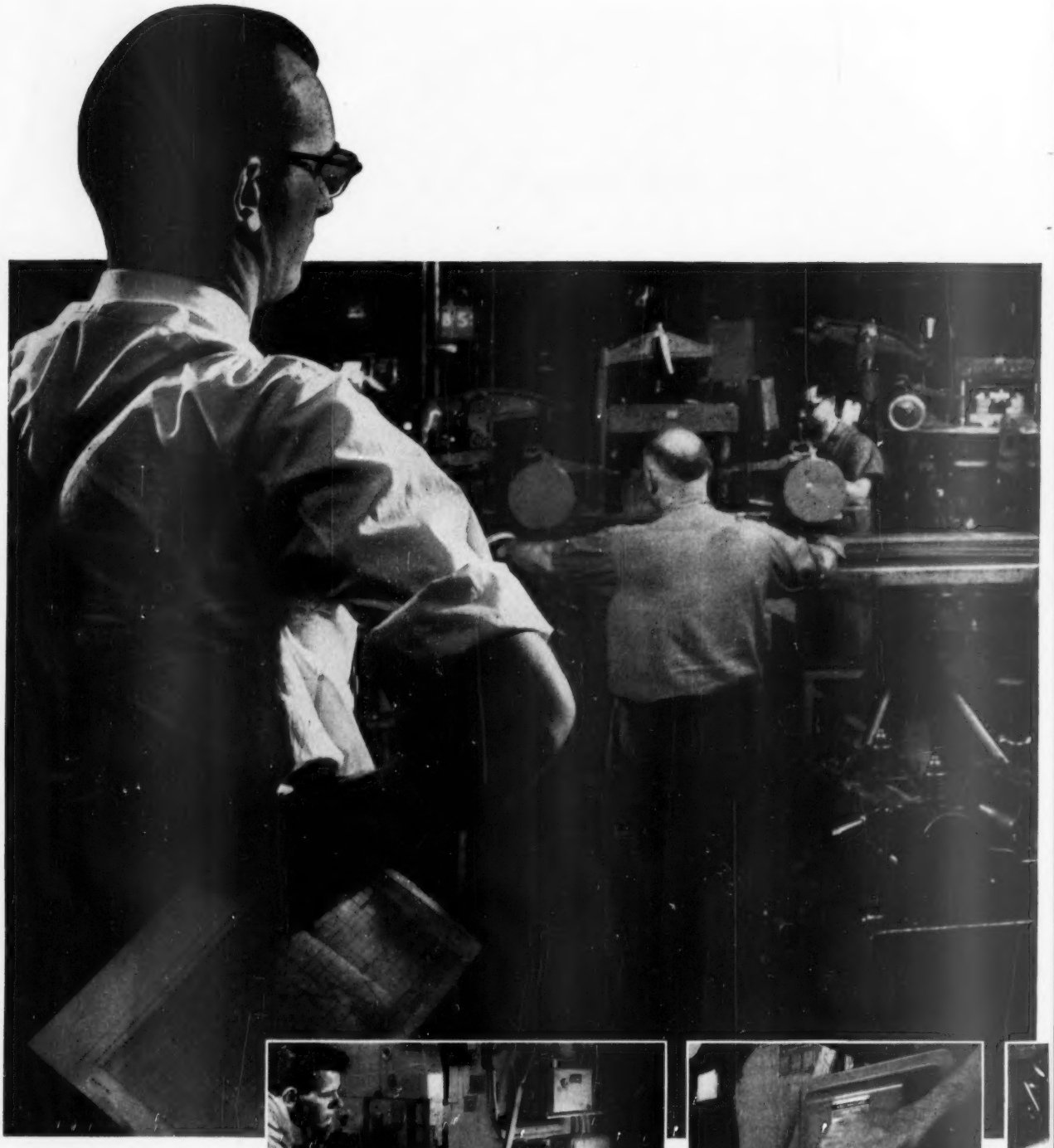
You can move big volumes of water with *low* operating and maintenance costs. These Angleflow Pumps, with their wide, unobstructed impeller and volute passages, are especially suitable for primary water supply service or for big booster pump service.

For information, see your local Fairbanks-Morse Pump Engineer . . . or write Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

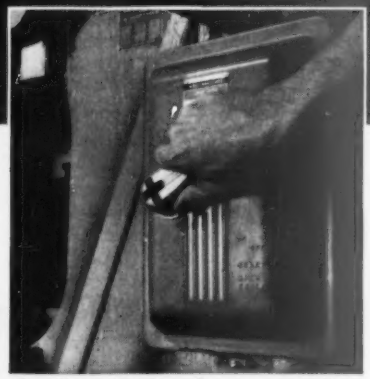
a name worth remembering when you want the best

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY
RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS



1. Hot schedules — close deliveries

2. Hot circuits—lost production



3. Circuit Breakers installed

The case of the

$1095 IN LOST PRODUCTION

Westinghouse Circuit Breakers now save man-hours, machine hours, boost output

A midwestern manufacturer, booked to capacity, was plagued by repeated power outages from blown fuses. The resulting downtime threatened delivery schedules—actually lost $1095 worth of irreplaceable production.

Then Westinghouse Circuit Breakers were installed. Result: production boosted, schedules saved, problem solved.

Why? Because Westinghouse Circuit Breakers eliminate *unnecessary* downtime. They trip only on dangerous overloads or destructive short circuits. They ride out temporary, harmless overloads that blow fuses and halt production needlessly.

With Westinghouse Circuit Breakers, operators can restore power instantly and with perfect safety—by merely flipping the handle. No time is wasted searching for fuses or tracking down electricians. And most important of all, the possibility of over-fusing or under-fusing is eliminated forever.

Fuses destroy themselves, but Westinghouse Circuit Breakers provide positive protection for the life of the installation—with no maintenance of any kind required. Calibration is precise—permanent—tamperproof.

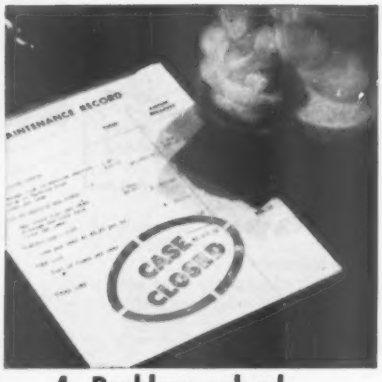
What is fuse protection costing you—in lost production, in maintenance time, in fuse replacements? Get true protection—for men, machines, production, sales—with rugged, reliable Westinghouse Circuit Breakers.

For the complete story, call your Westinghouse Distributor, or write for Booklet B-5407 on AB Circuit Breakers, or Booklet B-5456 on AB-I Circuit Breakers, Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa.

J-30132

YOU CAN BE SURE...IF IT'S

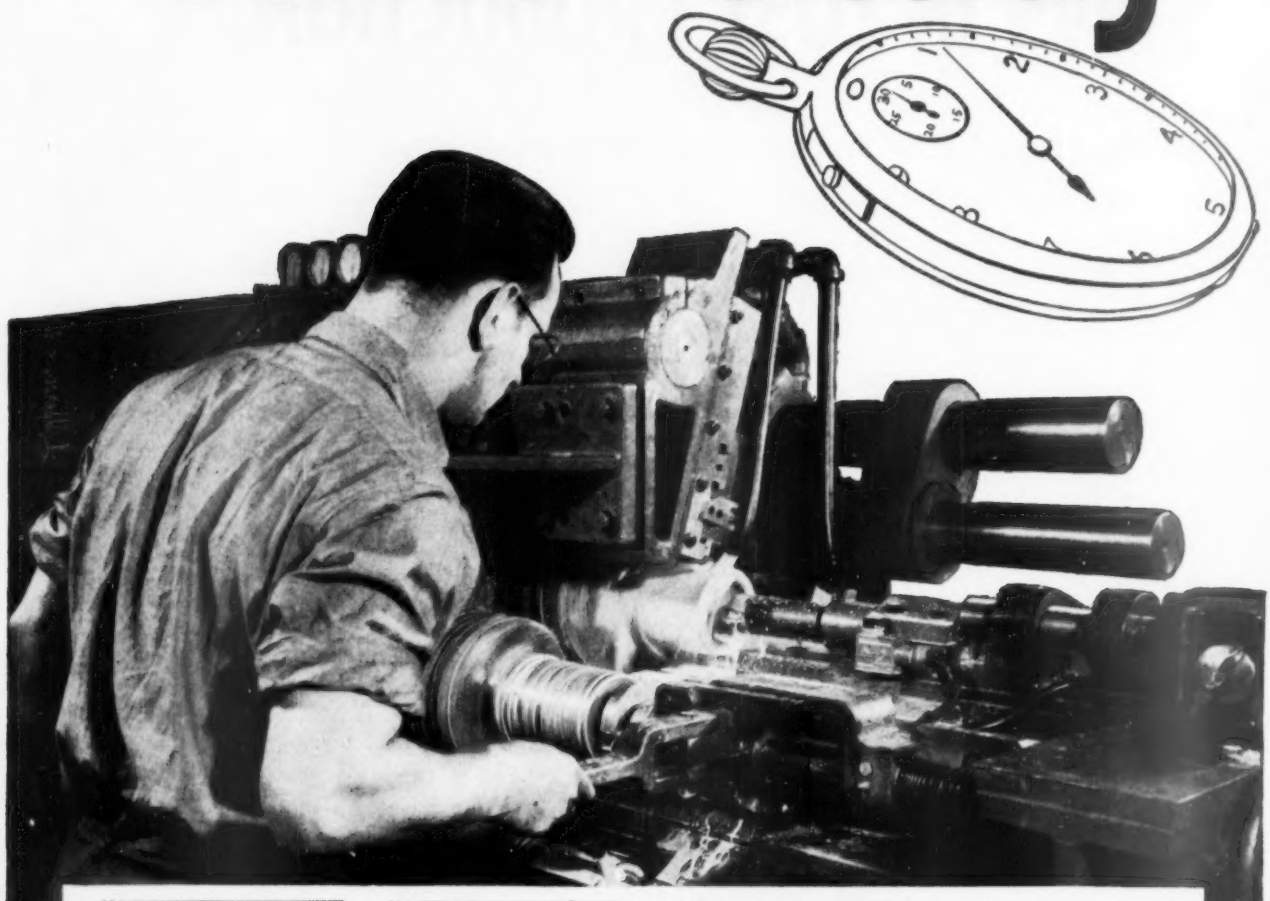
Westinghouse

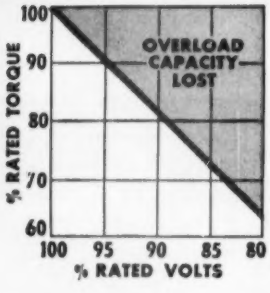


4. Problem solved

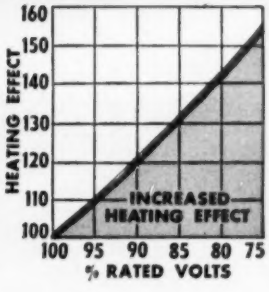
Of course...Circuit Breakers save money

Time-Study

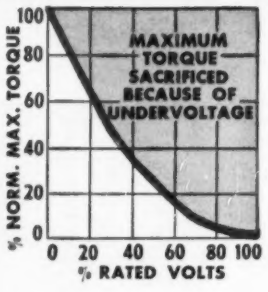




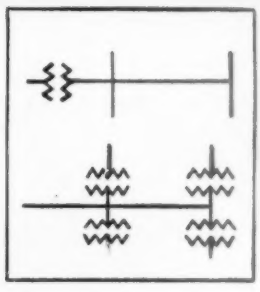
FULL PRODUCTION demands that rated voltage be maintained to all motors. Overload capacity, that extra push necessary for short intervals on many processes, falls off rapidly on undervoltage . . . falls approximately 10% for every 5% drop below rated voltage.



MOTORS BURN OUT quicker at undervoltage because of increased heating effect. Overload relays in the controls protecting your motors trip because of the extra current through them, open circuits to motors — cause machine down-time and production loss.



JOBS TAKE LONGER because torque and horsepower drop when voltage drops. Less torque means lighter cuts on lathes, shapers and other machine tools. More time must be spent to get the same job done. More overhead, more manhours must be figured into every job.



A MAJOR CAUSE of undervoltage is voltage drop in secondary feeders. Existing systems may not be adequate for new production schedules. Install A-C Substations at load centers to reduce line losses, cut feeder length, hold proper voltage, increase production.

Your Voltage

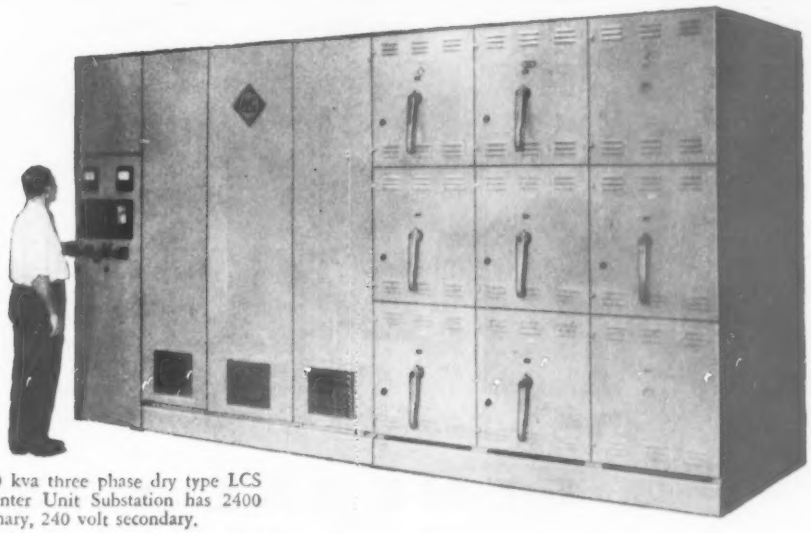
STOP WASTING MANHOURS on slow producing machines. Get the most from the production equipment in your plant by installing unit substations to correct undervoltage. No electrical equipment gives top performance *unless* it operates at rated voltage . . . and even well designed distribution systems may prove inadequate because of today's added loads and increased production schedules.

For example, if your squirrel-cage motors operate at 10% undervoltage, maximum torque available to start machinery is reduced 19% . . . heating effect within the motors is inceased 21% . . . overload capacity falls, efficiency drops.

Increase your output by eliminating production slow-downs resulting from overloaded motors . . . machine down-time due to tripped starters or circuit breakers. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install, and provide protection to personnel.

You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletins 11B6285A, 11B6325B and 11B6895. A-3371

LCS
Unit Substation



This 750 kva three phase dry type LCS Load Center Unit Substation has 2400 volt primary, 240 volt secondary.

ALLIS-CHALMERS

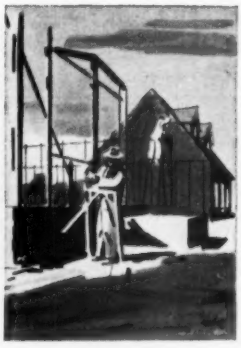
A-C ALLIS-CHALMERS

For every Electrical need

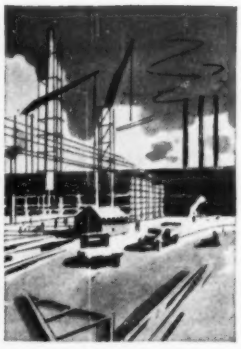
CHECK General for ELECTRICAL

AUTOMOTIVE - AIRCRAFT

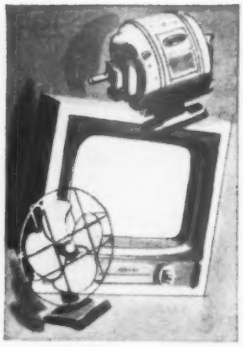
COMMUNICATIONS



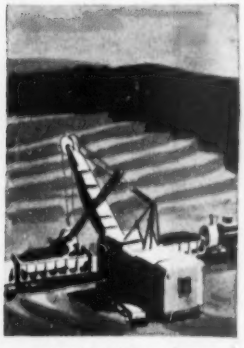
CONSTRUCTION



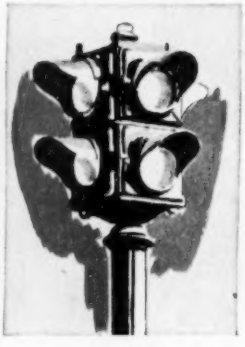
GENERAL INDUSTRY



MFRS. ELECTRICAL APPARATUS

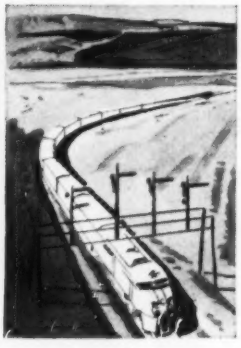


MINING-EARTH MOVING

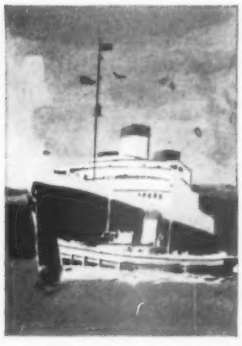


MUNICIPAL

POWER



RAILROADS



SHIPBUILDING - SHIPYARDS

GENERAL CABLE
CORPORATION

"More Power to You"®

GENERAL CABLE GENERAL CABLE GENERAL CABLE

Executive Offices: 420 Lexington Avenue, New York 17, N. Y.
Sales Offices in Principal Cities of the United States

Cable FIRST
WIRE and CABLE

Copper, bronze and aluminum conductors in thousands of different sizes and types of product. Constructions and insulations of every modern variety.

This is General Cable, a *prime source of supply* for everyone who generates electricity, distributes electricity or utilizes electricity.

Whatever your electrical wire and cable need, whenever you need it—say "General Cable" to your purchasing agent, your distributor—or call on the nearest General Cable office.

ONE Source of Complete Supply

ONE Completeness of Service

ONE Standard of Quality

For Quicker Service Anywhere in the United States...General Cable maintains

22 Sales Offices

14 Resident Sales Representative Locations

Over **600** Distributor Sales Locations

6 Regional Stock Distribution Points

6 Manufacturing Plants and Stocks

THE COMPANY THAT

(A sad ad that ends up glad)

AMERICAN MUTUAL A M

Service from salaried representatives in 78 offices! Savings from regular substantial dividends!

FELT RATHER LOW!

by Mr. Friendly

I saw a sight I could hardly ignore . . .
The Board of Directors lay on the floor!
The President sighed, "You might as well know
We're somewhat depressed. We feel rather low."

He sobbed in the rug, then said with a frown,
"Accidents seem to have gotten us down . . .
Morale, production and profits are at
A low that has left us flatter than flat!"

That's when I showed them, right then and there,
How we had one company walking on air . . .
So accident free* that their spirits rose
And they had to tie anchors onto their toes!

***HOW WE SAVED PEOPLE, PROFITS AND PRODUCTION**

(An American Mutual Brief Case)

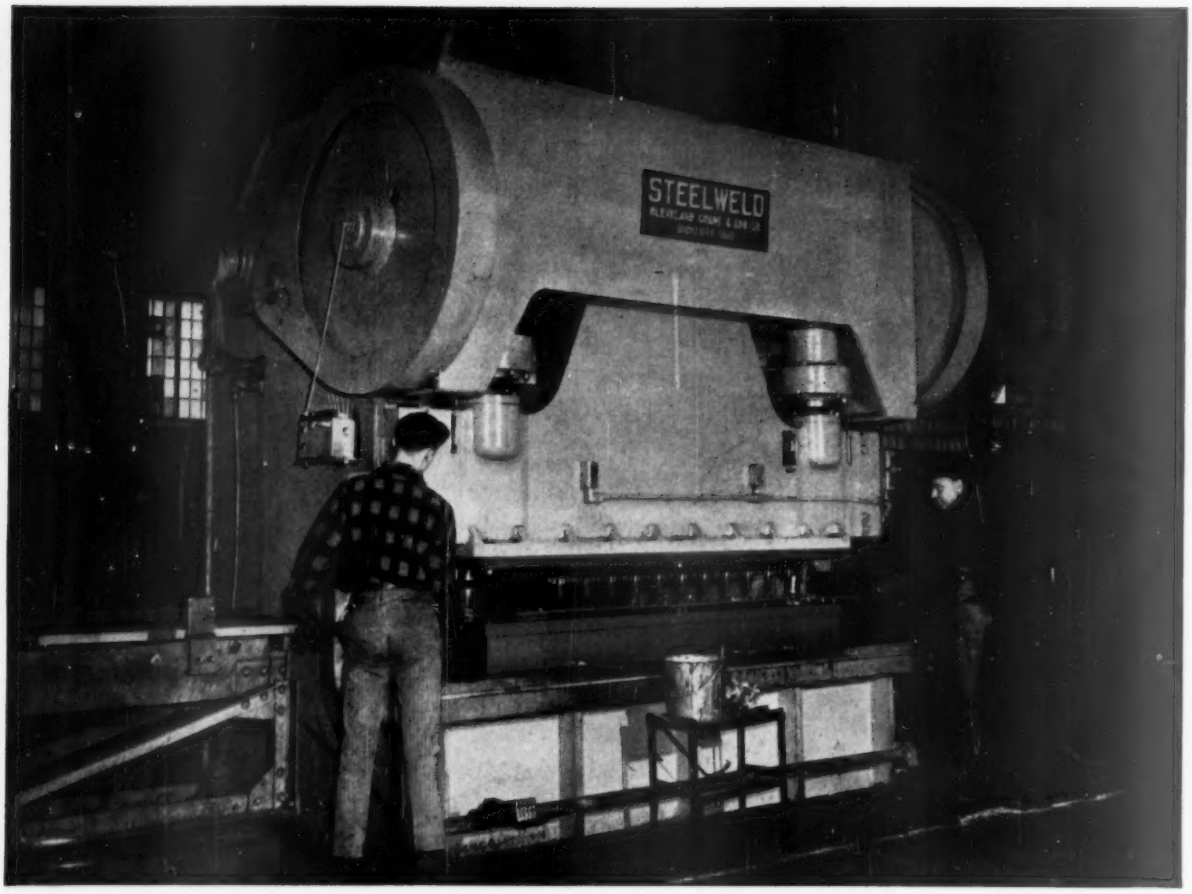
Company: New England Wire Manufacturer.

Problem: Increasing number of accidents, high insurance rates, poor production, due to 325% business expansion in 2 years.

Solution: Our job-safety analysis program helped reduce accident frequency 40% . . . reduced insurance costs, production costs!

Offer: For complete details on this dramatic safety engineering case study, plus 6 other outstanding accident-control achievements, write for "The Case Book of Safety Engineering at Work," American Mutual Liability Insurance Company, Dept. F-49, 142 Berkeley Street, Boston 16, Mass.

©1953, AMERICAN MUTUAL LIABILITY INSURANCE COMPANY



Model K5-8 Press, one of two Steelwelds in continuous 24-hour service since 1945, punching a series of holes in bridge floor bars.

2,000 Bars slotted every 8-Hour shift

Although originally conceived as machines for bending metal, Steelweld Presses are now serving a wide variety of uses. Two large Steelwelds at the MacDonald, Ohio Plant of the Carnegie-Illinois Steel Corporation are used solely for punching slots in steel bars, beams and T-sections for bridge flooring.

The time of one press is devoted largely to punching slots in bars 1⅜" and 1-7/16" wide by ¼" thick by 6'-2" long. Each bar contains 13 slots ½" wide by ⅝" to ⅞" long, and 24 slots ¼" wide by ⅝" to ⅞" long, a total of 37 slots all punched at one time. Two thousand bars are slotted in an eight hour shift.

Another standard job is that of punching 2-inch long slots on 4-inch centers in I-beams for bridge sections. These are punched 24 at a time. The beams vary in length from 24'-0" to 45'-0". Two hundred 40'-0" beams are punched in an 8-hour period.

Both Steelweld Presses have been in this service 24 hours a day since 1945.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

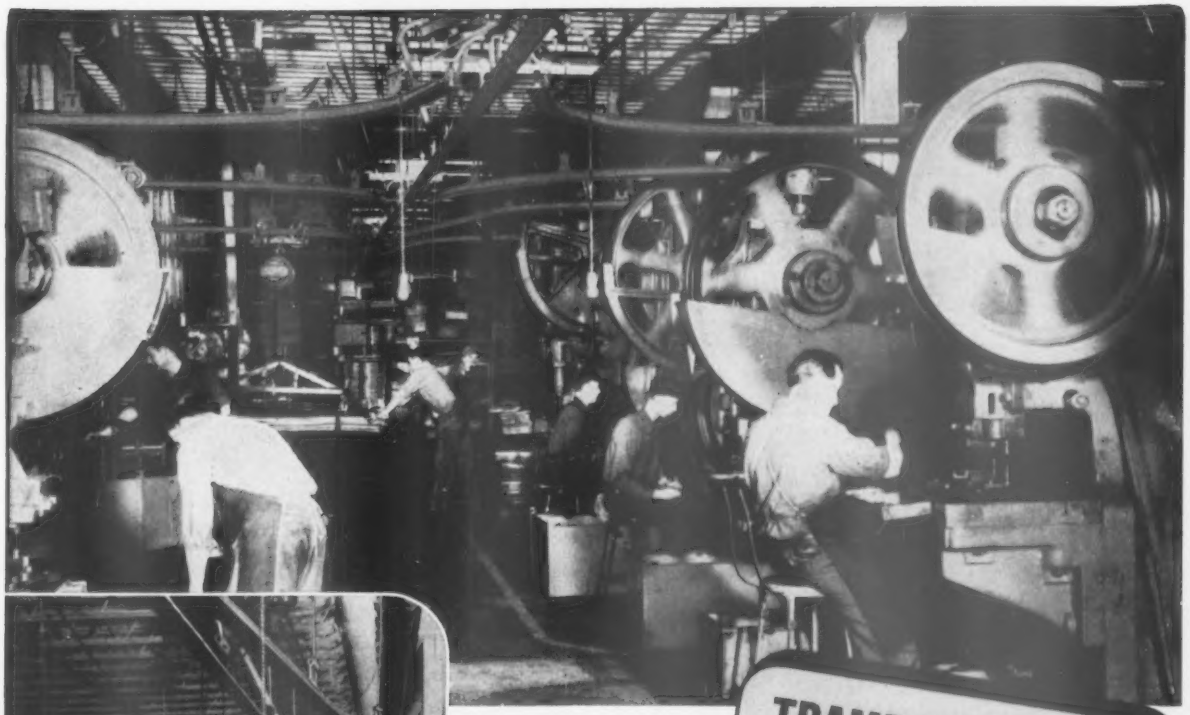
THE CLEVELAND CRANE & ENGINEERING CO.

3232 E. 281st ST., WICKLIFFE, OHIO

STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING



This illustrates the extreme flexibility of Cleveland Tramrail. This rail system is so laid out that hand-operated hoist carriers can deliver materials from any press to any other press without intermediate handling.

Courtesy United States Register Co., Battle Creek, Mich.

TRAMRAIL SERVES EVERY PRESS at United States Register Company

Boxes of materials are easily picked up and transported. If desired, this type of Cleveland Tramrail system can be electrified and the heavy lifting done with motor-driven hoists.

75% REDUCTION IN TIME FOR DIE CHANGES – NO HANDLING ACCIDENTS SINCE INSTALLED IN 1938 . . .

An inexpensive, easily-installed, hand-propelled Cleveland Tramrail system interconnects all presses with each other and also connects each with the die storage and machine shop. All but 18 small presses are served this way.

Hand and motor driven hoists are used in making die changes and servicing the presses with raw stock. Dies up to one ton are handled without difficulty and with 75% reduction in time over hoists formerly used.

No accidents in the handling of dies and materials have occurred since this system was installed in 1938.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3249 E. 284th ST. *WICKLIFFE, OHIO*

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

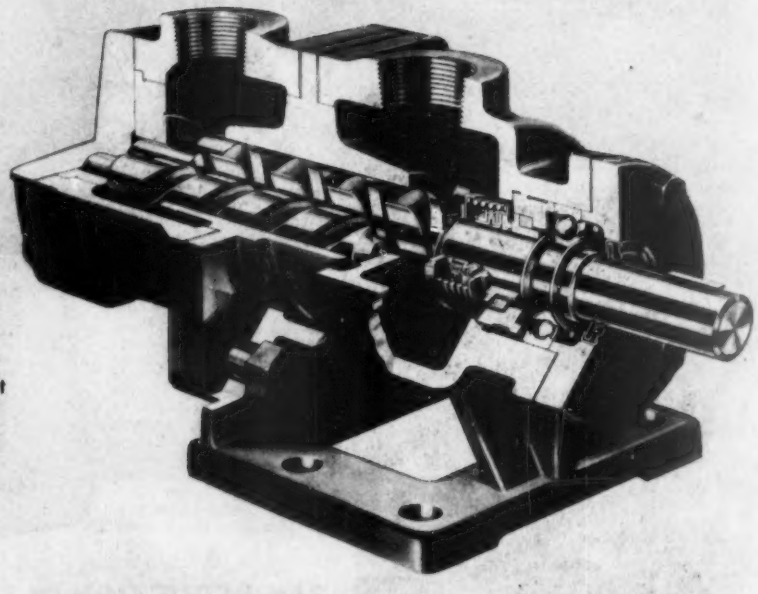
YOUR

DE LAVAL

FIELD REPRESENTATIVE

can help solve your pumping problems

Profit by his sound, versatile experience. He can aid you in selecting the IMO Pump you need . . . give you facts and figures on performance . . . bring valuable judgment to bear on your specific fluid handling application.



For example, De Laval-IMO Series A313B Pump handles light or viscous fluids in hydraulic systems, rotary and steam atomizing oil burners, lubrication, governing systems and similar services. Use it for capacities to 80 gpm, pressures to 275 psi and intermittent pressures to 325 psi.

IMO Rotary Pumps have only 3 moving parts. There is nothing to get out of order, nothing to adjust. IMO Pumps are also easy to install. They can be direct-connected to electric motors, turbines or other high speed drivers, without reduction gearing, belts or chains.

Rotors are in hydraulic and dynamic balance. That means pulsation free operation—no churning, no pocketing, no intermittent strokes. The natural smooth rolling action of IMO rotors eliminates noise, vibration and hydraulic whine.

Models can be furnished for almost any fluid handling problem in capacities to 750 gpm and pressures to 1,500 psig. *Ask for Bulletin LG-A which gives data in chart form on the wide range IMO line.*

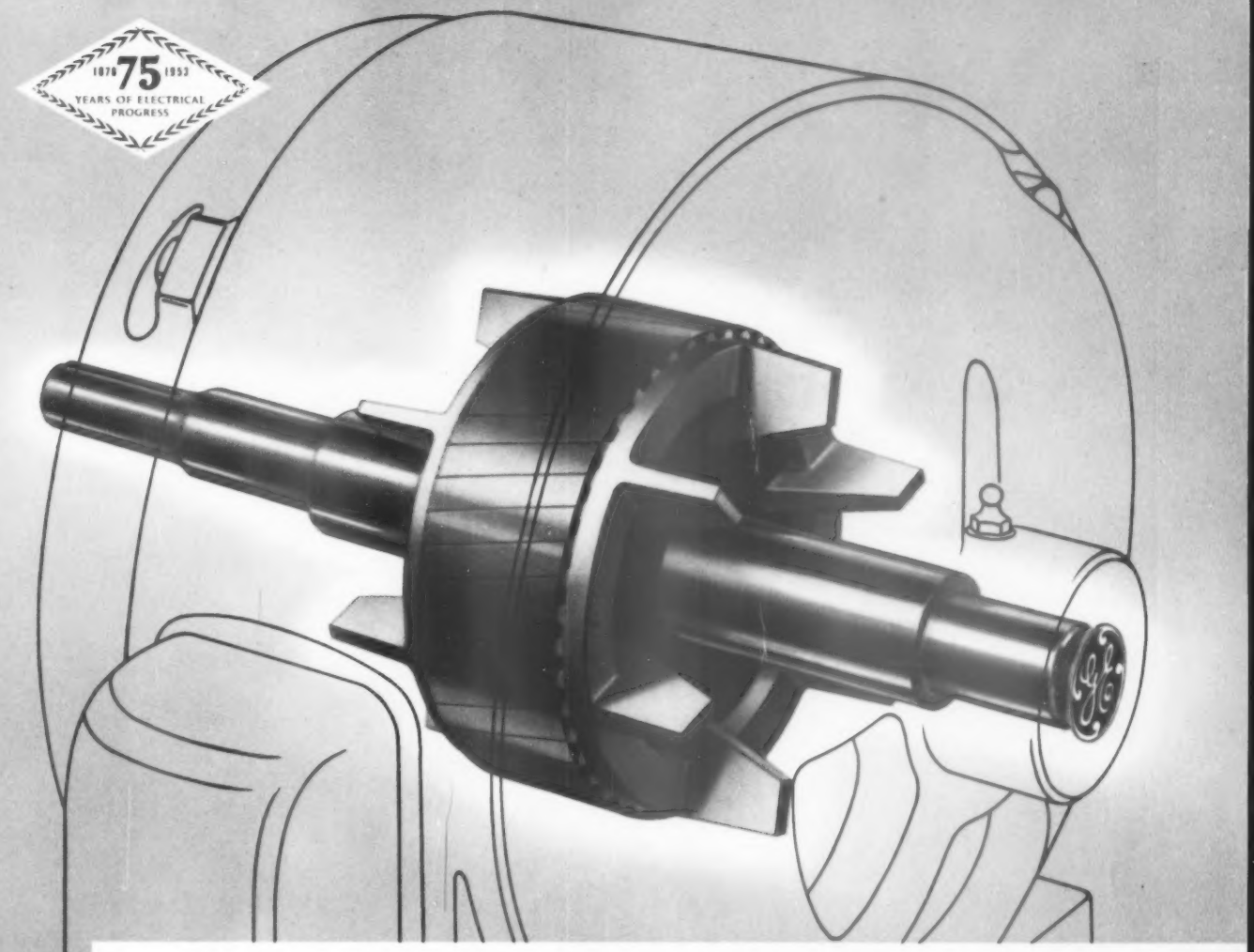
DE LAVAL *IMO Pumps*

DE LAVAL STEAM TURBINE COMPANY

804 Nottingham Way, Trenton 2, N. J.

DL187

1876 75 1953
YEARS OF ELECTRICAL PROGRESS



Why rotors don't fail in G-E TRI-CLAD motors

REG. U.S. PAT. OFF.

G-E pioneering and research developed and produced this one piece cast-aluminum rotor winding, which has virtually eliminated rotor failures in Tri-Clad motors.

Rotor is indestructible in service because the bars, end rings, and fans are a "one-piece" casting. No brazed joints, no fabricated fans to come apart.

Rotor inertia is reduced by the lightness of the aluminum, thus raising efficiency and allowing easier starting, stopping and reversing.

Rotor efficiency is higher, operating losses reduced, as the result of a special chemical treatment.

The motor runs cooler because the integrally cast fans dissipate heat faster.

Operation is smooth and quiet due to the dynamic balancing of the rotor which also reduces bearing wear and material fatigue.

Long rotor life is one more reason why G-E Tri-Clad motors last longer — give you more reliable service and greater operating economy.

Order Tri-Clad motors today from your nearby G-E representative. You'll find popular models in stock. General Electric Co., Schenectady 5, N. Y.

752-20

You can put your confidence in—

GENERAL ELECTRIC

CONNECT TO BATTERY as Frank J. Thornton, foreman of the Albany Freight Transfer, Delaware & Hudson Ry. is doing, then . . .

TURN ON TIMER . . . and the charger takes over automatically. When charge has been completed, units turn off automatically.

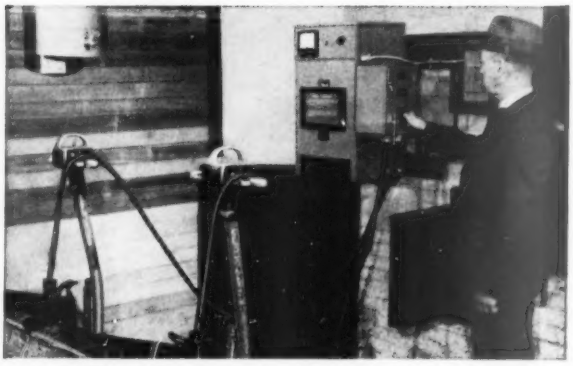
Why Delaware & Hudson Railroad Uses G-E Chargers for Driver-Lead Trucks

Five nights a week for the past three years, two G-E Rectifier Battery Chargers with sequence charge control have charged four driver-lead trucks at the Delaware & Hudson Railroad Corp's. Albany Freight Transfer. "Excellent service" reports A. B. Cook, Freight Agent in Albany. "We need top efficiency for closely-timed freight handling, and we get it with G-E Rectifier Battery Chargers."

Easy to install, easily moved to more efficient locations, and simple to operate as well, G-E Rectifier Battery Chargers have no moving parts to wear out, require virtually no maintenance, and can be adjusted to charge different types and sizes of batteries. The high quality rectifier stacks assure long, economical life.

For more information, see your truck manufacturers' agent or G-E Sales Office. For literature write to Section 463-9, General Electric Co., Schenectady 5, N. Y.

1876 75 1951 YEARS OF ELECTRICAL PROGRESS



DOUBLE CHARGING CAPACITY with G-E Sequence Control, for less than the cost of an additional charger. With one charger you can charge 2 batteries in 13 hours or less.

You can put your confidence in—

GENERAL ELECTRIC

SHUTDOWN TIME WAS GREATLY REDUCED when a filter fabric of acid-resistant "Orlon" replaced a conventional fabric in this hydraulic filter press. Operating in an acid solution, the new fabric lasts 90 times longer, cuts fabric costs, too.

STRONGER TAPING . . . LESS DOWNTIME for changing rolls, when nylon fibers reinforce tape for heavy-duty boxes. Finer yet stronger nylon strands make a flat, flexible tape that can be applied more quickly. And there's 25% more tape to the same-sized roll!

3 YEARS WITHOUT TIME LOST for take-ups! That's the record of this conveyor belt, sinewed for extra strength with "Cordura" rayon. The stretch-free strength of "Cordura" yarn permits thinner, more flexible belts for better troughing . . . trouble-free operation.

Man-made fibers are speeding production

. . . AND MAY WELL DO IT FOR YOU

Today, man-made fibers are helping industry speed production . . . make better products . . . cut costs. New properties . . . in new combinations . . . plus the greater uniformity of Du Pont man-made fibers make possible this new efficiency and economy.

Du Pont's five versatile fibers—nylon, acetate, "Cordura", "Orlon"* and "Dacron"—still have a great untapped potential as raw materials for industry. They may offer *you* opportunities for improving products and processes—as they have in the examples shown here. It will pay you to investigate them in terms of *your* needs. Write us for full information, mentioning the uses you have in mind. E. I. du Pont de Nemours & Co. (Inc.), Room 2520-N, Wilmington 98, Del.

MORE EFFICIENT WIRE WRAPPINGS for transformer cables are made with "Dacron". This remarkable fiber gives increased abrasion resistance, smaller wrapping size, smoother surfaces for easier transformer assembly. Costs less than standard insulation, too!

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

FIBERS TO FIT INDUSTRY'S NEEDS

NYLON

High strength wet and dry; elastic, shock-resistant, high flexibility. Resists deterioration from oils, alkalies. Tough, durable, lightweight. High abrasion resistance.

CORDURA*

high tenacity rayon

High strength with low cost, low bulk; high resistance to stretch; resistance to heat. This high tenacity rayon has toughness, good durability and flexibility.

ORLON*

acrylic fiber

Dimensionally stable; strong wet and dry; low moisture absorption; resistant to sunlight, mildew and weather exposure. High resistance to acids and other solvents.

DACRON*

polyester fiber

High strength wet and dry; outstanding heat resistance; good chemical resistance; stretch resistance; good electrical insulating properties. Withstands abrasion, flexing.

*DU PONT TRADE-MARK

NEW

You need it! Send for free copy today!

United States Rubber Company, the only electrical wire and cable producer to grow its own natural rubber and to manufacture its own plastics and synthetic rubber, makes a complete line of electrical wires and cables for every industrial and domestic application. Just published is the 1953 "U.S." Catalog, essential for men who specify, install or maintain electrical wire and cable. Send for your free copy to address below. Here are the catalog chapter headings:

1. U.S. Royal Portable Cords and Cables
2. U.S. Railroad Wires and Cables
3. U.S. Power Cables
4. U.S. Control and Signal Cables
5. U.S. Building Wires and Cables
6. U.S. Bare and Weatherproof Wires
7. U.S. Flexible Cords and Cord Sets
8. U.S. Telephone Wires and Cables
9. Miscellaneous U.S. Wires and Cables
10. Technical Data

"U.S." Research perfects it...
"U.S." Production builds it

U.S. RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT • Rockefeller Center, New York 20, N. Y.

Durasheath: all-purpose power cable

In heavily industrialized areas, utilities can cut their installation and maintenance costs with light, tough DURASHEATH*. This flexible, easily handled cable may be run buried in the earth, in ducts or overhead (or in any combination) without needless, time-consuming jointing. Its light weight and flexibility make duct pulling fast even in zero weather. Aerial assemblies go faster. Linemen like to work with it. And you need stock only one cable type.

* * *

As one of several types of ANACONDA power cables, DURASHEATH is available in all sizes, single or multiconductor, copper or aluminum, from 600 to 15,000 volts. It is thoroughly dependable for industrial plants, railroads, series or multiple street lighting, traffic control, and airport† lighting, residential primaries and secondaries, as well as for such uses as Type USE cable for underground service entrance. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

*Reg. U. S. Pat. Off. 53313

ANACONDA®

Primary and secondary distribution cables • building, machine tool, control and communication wire • portable cords and cables • bus-drop cables • apparatus cables • copper, aluminum, copperweld conductors • wire and cable accessories.

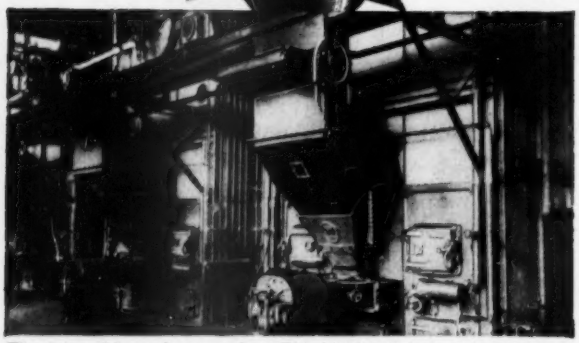
†when ordered to CAA Specifications L-824

"Orchids to Oppenheimer!

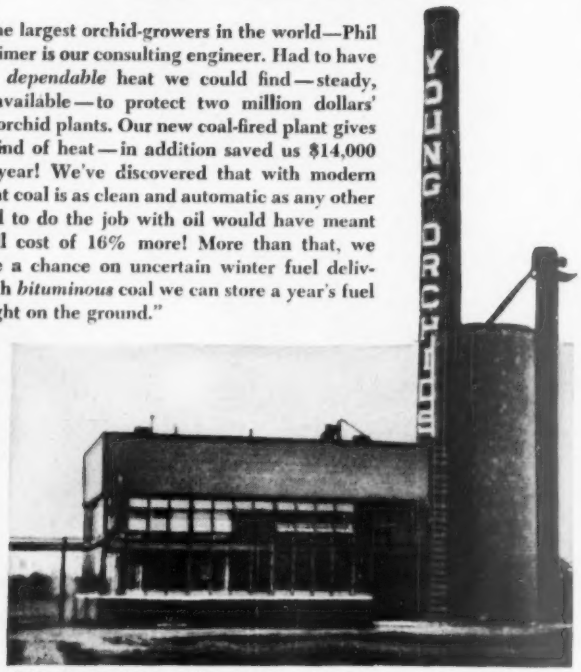
THAT NEW COAL HEATING SYSTEM HE DESIGNED SAVED $14,000 THE FIRST YEAR!"

says Carl R. Beckert, President, Thomas Young Orchids, Inc., Bound Brook, N. J.

"We're the largest orchid-growers in the world—Phil Oppenheimer is our consulting engineer. Had to have the most *dependable* heat we could find—steady, quickly available—to protect two million dollars' worth of orchid plants. Our new coal-fired plant gives us that kind of heat—in addition saved us $14,000 the first year! We've discovered that with modern equipment coal is as clean and automatic as any other fuel—and to do the job with oil would have meant an overall cost of 16% more! More than that, we can't take a chance on uncertain winter fuel deliveries. With *bituminous* coal we can store a year's fuel supply right on the ground."



The firing aisle at the new plant. This highly efficient coal equipment cut the company's fuel costs by 23%—is so completely automatic that it saved $6,000 the first year on labor costs, too!



This 300-ton silo that Young installed does away with former handling and shovelling costs. Coal is fed from the silo by a screw conveyor to each boiler's stoker-hopper—the coal is weighed on its trip.

- Use coal now? Get ALL coal's economy with highly efficient modern equipment. Building a new power plant? Find out how much more economical, efficient a job *bituminous* coal can do. Call in a competent consulting engineer. He can show you the modern coal-handling and combustion installations that will save most while meeting your particular needs. Remember you can count on *bituminous* coal! Of America's total fuel reserve—92% is coal! Even today oil is *imported*—while America can and does *export* coal! Ample coal reserves plus the outstanding efficiency of America's mining companies give coal users *the greatest possible assurance of a dependable fuel supply at stable prices.*

If you're running your own steam plant, here are just a few down-to-earth facts you can't afford to ignore!

COAL in most places is today's most economical fuel.

COAL resources in America are adequate for all needs—for hundreds of years to come.

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association
WASHINGTON, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

DIAMOND

ROLLER CHAINS AND SPROCKETS

A balanced stock meets requirements for all standard drive ratios and popular H. P. capacities*

* ROLLER CHAIN and SPROCKETS, Bushed and Fixed Bore

BUSHED SPROCKETS

With the Taper Bore Sprocket and Bushing, the bushing is changed to meet various bore sizes.

FIXED BORE SPROCKETS

Small size Diamond finished fixed bore stock sprockets (with keyways and setscrews) give the distributor the balanced stock to meet the widest possible chain drive requirements.

STOCK SPROCKETS FOR ALL POPULAR SHAFT SIZES

(Taper Lock and Fixed Bore Types)

The Diamond Chain combination of roller chains, taper bore sprockets and bushings, and the fixed bore sprockets in the small sizes provide for emergency and normal service demands for all standard drive ratios and popular horsepower capacities.

Take advantage of the "over-the-counter" availability of this Diamond stock of Chains and Sprockets for new applications and replacements. This stock is as near as your telephone. See the yellow pages of your classified telephone directory for the address of the Diamond Chain distributor.

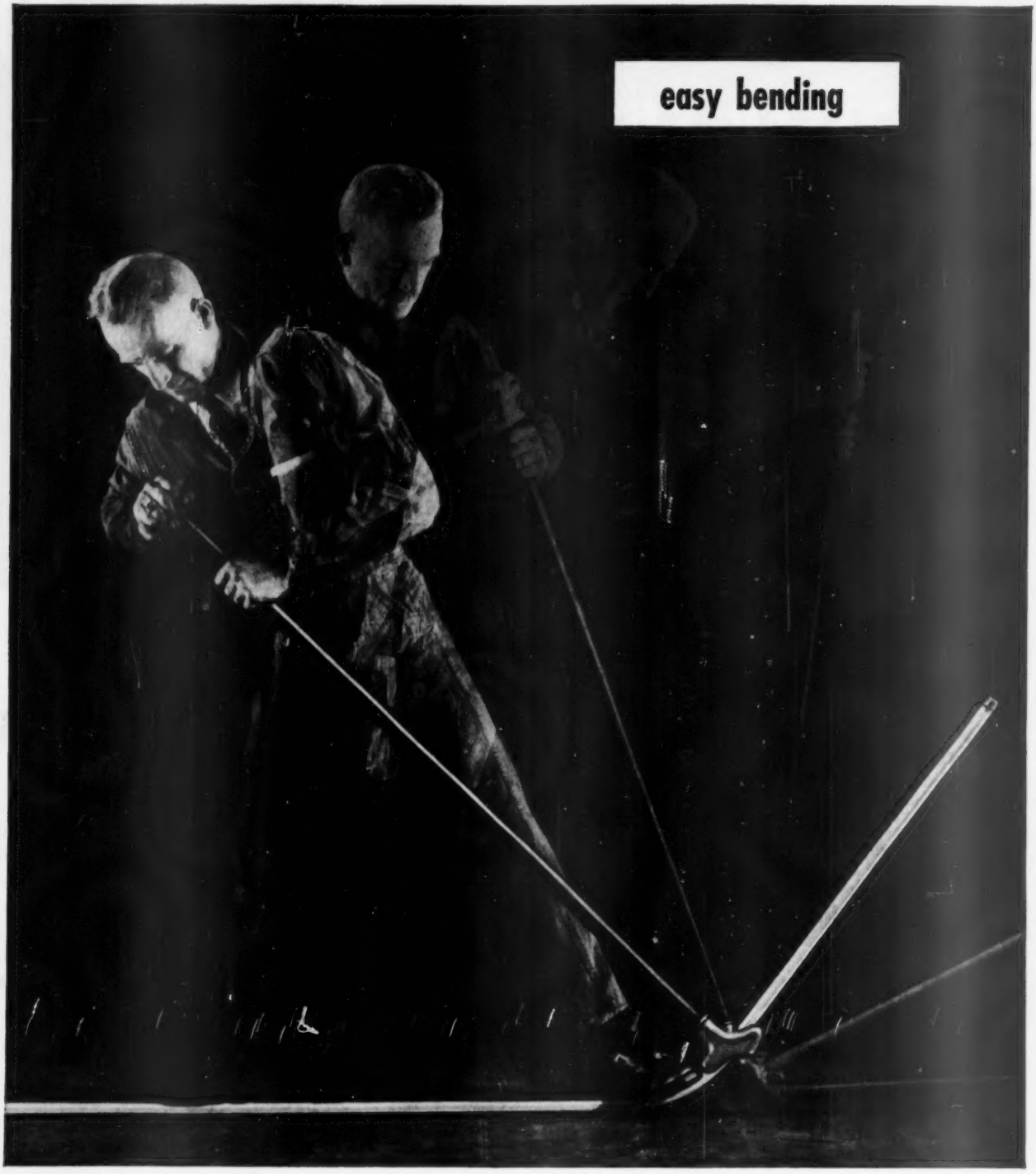
DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

Dept. 449, ***402 Kentucky Ave., Indianapolis 7, Indiana***

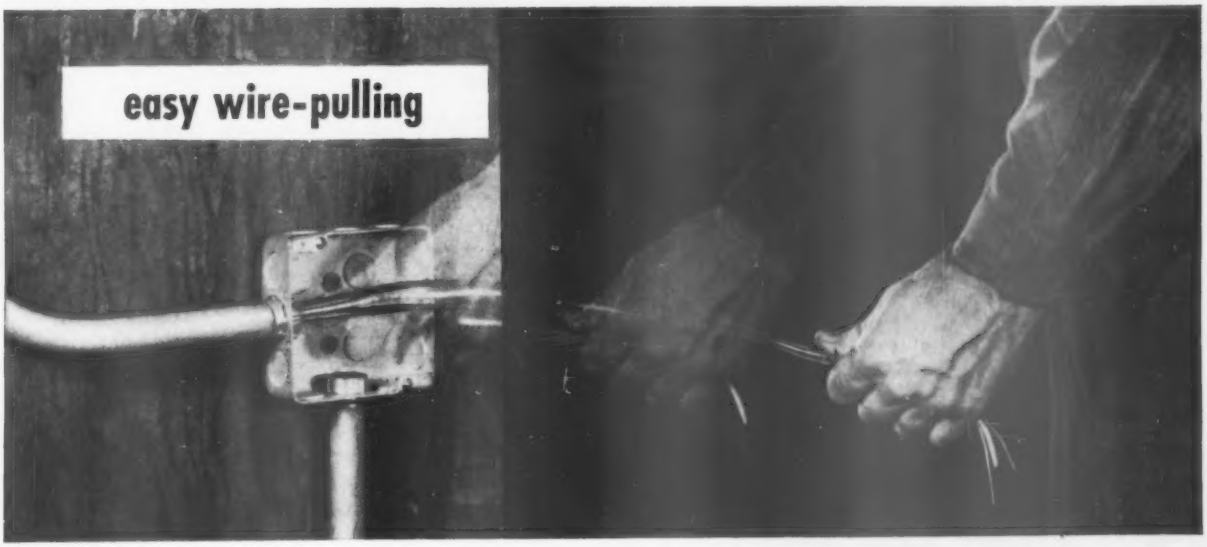
Offices and Distributors in All Principal Cities

G. E. announces



New G-E WHITE is easier to bend because the "metallizing" process eliminates the quenching and straightening that cause hardening.

new rigid conduit



Wire-pulling is easier because new G-E WHITE is lined with a new corrosion-resistant coating, containing an anti-friction agent. There is no roughness inside the conduit that might damage insulation.

A new G-E WHITE rigid steel conduit that has easy bending, easy wire-pulling, and improved corrosion-resistance characteristics has been introduced by General Electric's Construction Materials Division.

The result of an intensive research and development program, new G-E WHITE is now zinc-coated by means of a process called "metallizing." This process, while never before applied to rigid conduit, has been proved by more than 30 years of use on ships, pipelines, bridges, and trestles in damp and corrosive atmospheres.

In metallizing, pure zinc powder, reduced to a plastic state, is sprayed onto the conduit. This bonds a controlled, uniform coating of pure zinc to both pipe and threads to provide lasting protection against corrosion. Metallizing does not harden the conduit or form brittle zinc-iron alloy.

In addition to the metallizing process, a new anti-friction inside coating has been added to make wire-pulling easy . . . to provide permanent interior protection against corrosion.

The new G-E WHITE rigid conduit conforms with the American Standards Association specifications, is listed by Underwriters' Laboratories, Inc., and meets all U. S. Government specifications. Ask your distributor about the new G-E WHITE. Available in all size mixes. Section C24-834, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

Photograph courtesy of Metallizing Engineering Co., Inc.

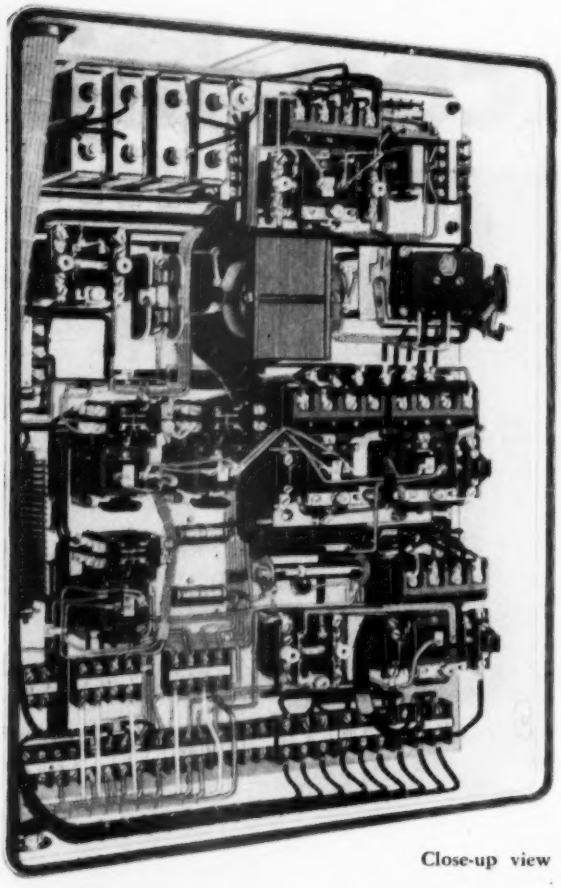
Better Corrosion Protection — The corrosion resistance of metallizing has been proved by 30 years of service, and by exhaustive tests in G-E laboratories. The hull and superstructure of the ship above depend on metallizing for protection against salt spray. The new G-E WHITE conduit has the added protection of a coating of C-553 lacquer over the metallized zinc.

New G-E WHITE

You can put your confidence in—

1876 75 1953 YEARS OF ELECTRICAL PROGRESS

GENERAL ELECTRIC



Close-up view showing Allen-Bradley controls.

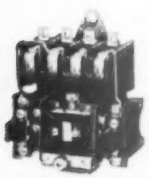
Barber-Colman HOBBING MACHINE
operated by Allen-Bradley Controls

Designed to cut quality gears with reduced machining time, this Barber-Colman Hobbing Machine is being recognized for its consistent accuracy under high production operation. To provide the reliable control necessary for this precision tool, it has been equipped with an Allen-Bradley control panel.

Allen-Bradley motor controls are rugged, compact, mounted on steel base plates, permit front of panel wiring . . . desirable features where a control panel must be squeezed into "tight" quarters. The simple design and trouble free operation of Allen-Bradley controls guarantee continued customer satisfaction in your machines. Allen-Bradley motor controls are a distinct sales asset to your motorized equipment. Standardize on Allen-Bradley controls, today.

Allen-Bradley Co., 1321 S. First St., Milwaukee 4, Wis.

Bulletin 700
Universal Relay



Bulletin 709
Solenoid Starter

Bulletin 800T Oiltight Push Button and Selector Switch

A-B Quality

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

QUALITY

There's a *simple* way to solve what appears to be a complex speed reduction problem

Get the proper drive combination that best meets your requirements from the broad LINK-BELT line

YOU'LL find your power transmission costs are lowered several ways when you use Link-Belt enclosed gear drives. First, Link-Belt offers a broad range of types and sizes in helical, herringbone and worm gear designs. You get the *one* reducer best suited to your needs.

In addition, Link-Belt builds a complete line of power transmission machinery. Installation and alignment are simplified because dimensions of Link-Belt chains and sprockets, bearings and couplings are all coordinated. And there's no need to call in another firm for any information or assistance.

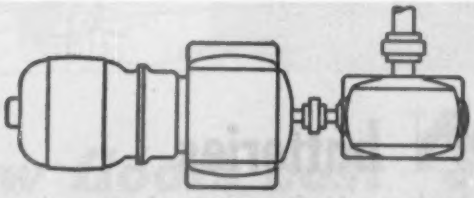
This overall integration—plus the long life built into every piece of Link-Belt equipment—guarantees optimum efficiency. Result: lower power consumption and maintenance costs.

Make the nearby Link-Belt sales office or distributor your power transmission headquarters. Nowhere else can you get the great selectivity that assures you of the best in enclosed gear drive applications.

LINK-BELT

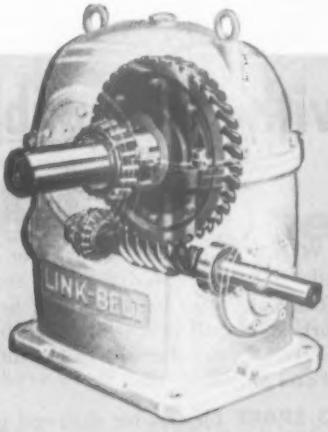
ENCLOSED GEAR DRIVES 13,127

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.



Worm Gear Drive

WORM GEAR and P.I.V. variable speed drives are shown direct-coupled. Link-Belt worm gear drives are available in 3.1:1 to 8000:1 reduction ratios—1400 to 123,000 in. lbs. torque—0.22 to 564 output shaft rpm. Ask for Book 2324A.

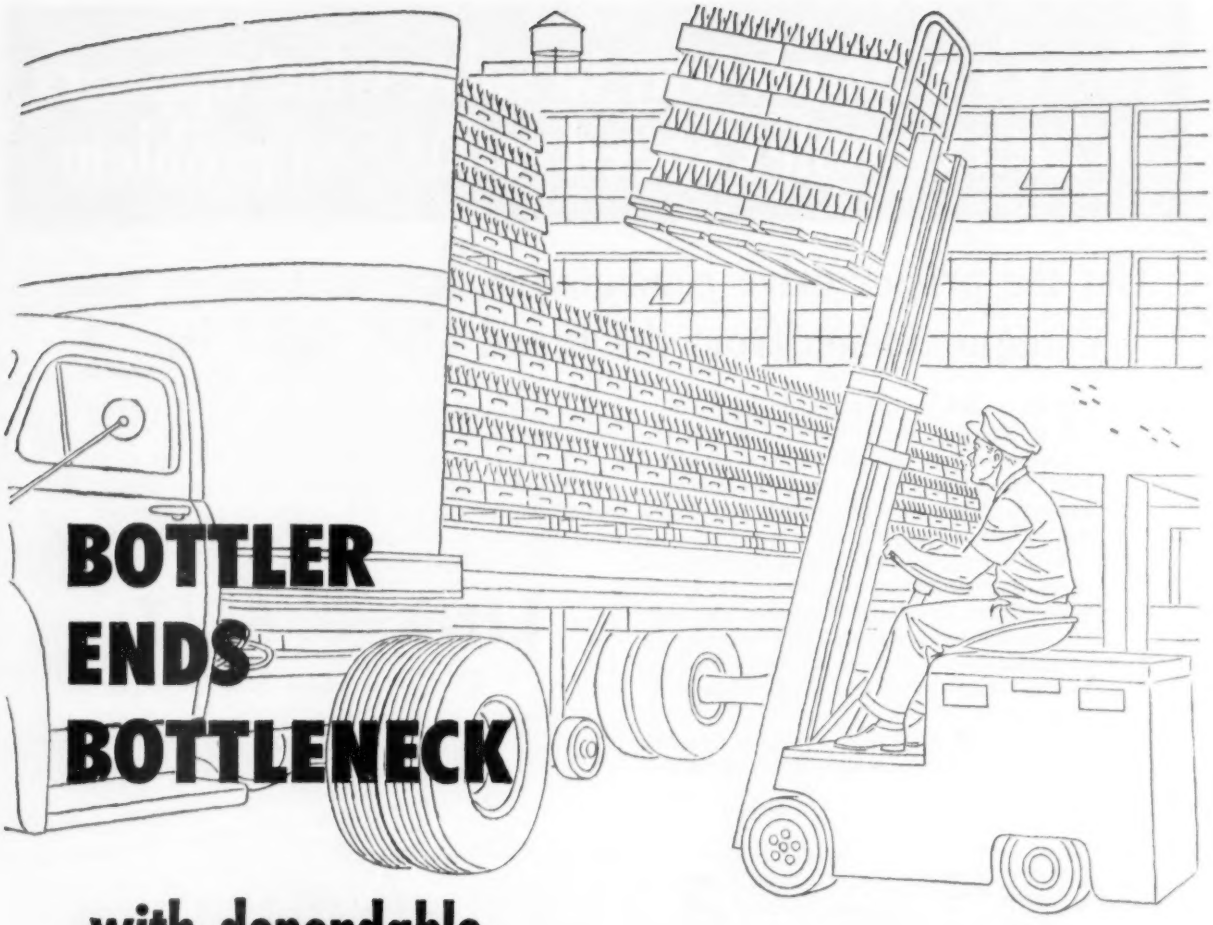


Gearmotor & Helical Gear Drive

GEARMOTOR is shown with roller chain drive. Link-Belt Helical Gear Drives, Gearmotors and Motogears are available in 6.2:1 to 292:1 reduction ratios—1 to 30 hp—6 to 280 output shaft rpm. Ask for Books 2247 and 2451.

Herringbone Gear Drive

HERRINGBONE GEAR DRIVE is shown connected by flexible coupling to motor and with roller chain takeoff. Link-Belt Herringbone Gear Drives are available in 2.84:1 to 326:1 ratios—0.4 to 2480 hp—2.2 to 623 output shaft rpm. Ask for Book 2519.



BOTTLER ENDS BOTTLENECK

with dependable EDISON batteries

HEAVIEST WORK comes at day's end for an eastern bottler of one of the country's most popular soft drinks. After batteries have been powering fork trucks all day serving bottling machinery, fifty highway delivery trucks must be unloaded and re-loaded.

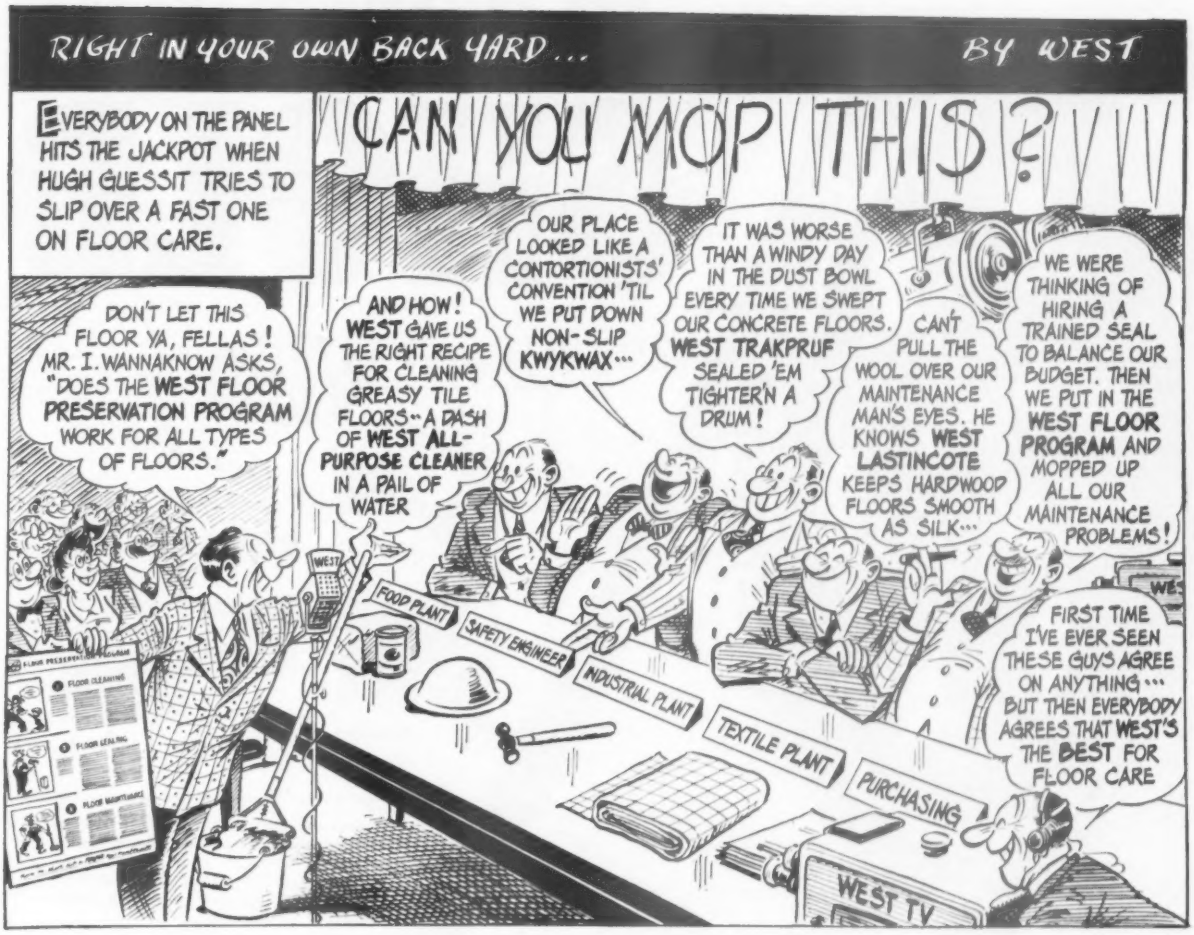
POWER TO SPARE for this big shift-end job is provided by dependable EDISON batteries. In twelve minutes, one man and a fork truck unload and re-load a delivery truck—a job that formerly took four men twenty minutes.

BEFORE RECHARGING, batteries have sometimes remained in service nearly sixteen hours continuously. Spare batteries are used only when operations continue far beyond an eight hour shift. Further, the ability of EDISON batteries to take a quick boost-charge during lunch hour has been a big factor during the busy season.

ON ALL COUNTS—dependable power through extra hours and extra years . . . lower maintenance cost . . . less downtime—EDISON batteries are best for your job. Electrically, they're practically foolproof. Their steel cells make them practically indestructible. Have your Edison field engineer survey *your* battery needs. Send for Bulletin S.B. 2039 and S.B. 3808 for detailed information. Edison Storage Battery Division of Thomas A. Edison Incorporated, West Orange, N. J.

Most Dependable Power
—Lowest Over-all Cost
***. . . you get both with an* EDISON**

EDISON
Nickel · Iron · Alkaline
STORAGE BATTERIES


RIGHT IN YOUR OWN BACK YARD...
BY WEST
EVERYBODY ON THE PANEL HITS THE JACKPOT WHEN HUGH GUESSIT TRIES TO SLIP OVER A FAST ONE ON FLOOR CARE.
CAN YOU MOP THIS?
DON'T LET THIS FLOOR YA, FELLAS! MR. I. WANNAKNOW ASKS, "DOES THE WEST FLOOR PRESERVATION PROGRAM WORK FOR ALL TYPES OF FLOORS."
AND HOW! WEST GAVE US THE RIGHT RECIPE FOR CLEANING GREASY TILE FLOORS--A DASH OF WEST ALL-PURPOSE CLEANER IN A PAIL OF WATER
OUR PLACE LOOKED LIKE A CONTORTIONISTS' CONVENTION 'TIL WE PUT DOWN NON-SLIP KWYKWAX...
IT WAS WORSE THAN A WINDY DAY IN THE DUST BOWL EVERY TIME WE SWEPT OUR CONCRETE FLOORS. WEST TRAKPRUF SEALED 'EM TIGHTER'N A DRUM!
CAN'T PULL THE WOOL OVER OUR MAINTENANCE MAN'S EYES. HE KNOWS WEST LASTINCOTE KEEPS HARDWOOD FLOORS SMOOTH AS SILK...
WE WERE THINKING OF HIRING A TRAINED SEAL TO BALANCE OUR BUDGET. THEN WE PUT IN THE WEST FLOOR PROGRAM AND MOPPED UP ALL OUR MAINTENANCE PROBLEMS!
FIRST TIME I'VE EVER SEEN THESE GUYS AGREE ON ANYTHING... BUT THEN EVERYBODY AGREES THAT WEST'S THE BEST FOR FLOOR CARE
FOOD PLANT
SAFETY ENGINEER
INDUSTRIAL PLANT
TEXTILE PLANT
PURCHASING
WEST TV

New floors cost $300,000,000 *a year!*

TYPE OF FLOOR	INSTALLED COST* OF 50,000 SQ. FT.
Asphalt Tile	$15,000
Concrete	18,000
Linoleum	21,000
Hardwood	27,500
Cork	39,000
Rubber Tile	44,000
Vinyl Tile	44,000
Ceramic Tile	65,000
Terrazzo & Mosaic	87,500
Marble	150,000

**Based on reports of reliable flooring contructors in urban areas.*

How much will it cost you to replace worn-out floors today? The chart gives you some idea.

But, your floors *don't have* to wear out. They can be protected almost indefinitely.

How? With West's simple, proven FLOOR PRESERVATION PLAN. (1) *Cleaning* — remove all dirt without harming floors (2) *Sealing* — fill the pores. Provide a protective coating (3) *Maintaining* — put on a tough, anti-slip floor wax.

The West Plan offers you more than 20 proven products. A West Floor Specialist will be glad to help you select the program or product you need.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

Please send FREE booklet "Proper Care of Floors"

DEPT. 56

Name_____ Title_____

Company_____

Address_____

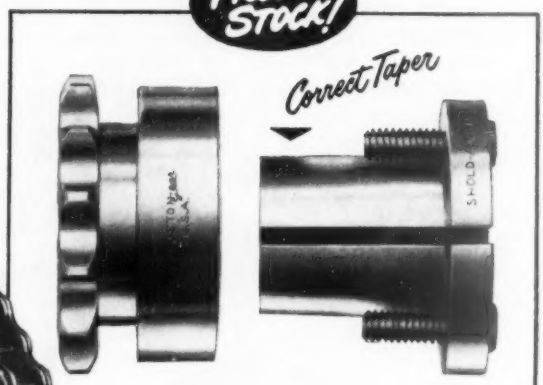
City_____ Zone____ State_____

New Buy-word for Top Value

SHOLD

FROM STOCK!

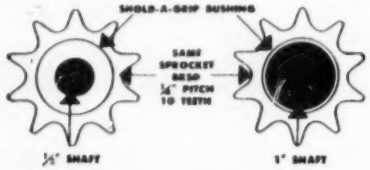
Correct Taper



Typical design (above) of SHOLD-A-GRIP Bushing and Sprocket with minimum number of teeth.
Typical design (below) of SHOLD-A-GRIP Bushing and Sprocket with maximum number of teeth.

FIT SHAFTS
½" to 2½" by 16ths

SHOLD-A-GRIP Sprockets of any commonly used pitch, ½" to 1¼", can be interchanged on an extended range of shaft sizes. SHOLD-A-GRIP design adds many smaller sprocket sizes to the interchangeable class.



Example: Sprocket BKSD, ¾" pitch, 10 teeth, can be used on 9 different shaft sizes, any size from ½" to 1" by 16ths, by inserting the correct size SHOLD-A-GRIP Bushing.

Engineered *originally* and *specifically* for Sprocket drives, SHOLD-A-GRIP Bushings are *not* an "adapted" design. Compare . . . see why SHOLD-A-GRIP means top efficiency, lowest maintenance costs.

GEARS • CHAIN and SPROCKETS • RATIOMOTORS • REDUCTORS • BOST-BRONZ Oil-Impregnated BEARINGS • PILLOW BLOCKS

in Sprocket Assemblies . . . ask for

-A-GRIP®

Interchangeable Tapered BUSHINGS and SPROCKETS

You'll be Sure to get . . .

Correct Taper

FOR SLIP-PROOF GRIP

In SHOLD-A-GRIP Bushings and Sprockets, you get a taper proved by exhaustive overload tests to be the optimum for slip-proof grip. When screws are tightened the bushing grips both sprocket and shaft with maximum holding power, even on shafts which vary from true diameter.

Correct Taper

FOR EASY REMOVAL

Correct taper saves time and trouble in removal. Cap screws are removed, then two screws are turned into the two threaded holes in bushing flange. Tightening screws releases bushing—quickly, easily.

Matched Tapers

AVOID "ROCKING" FIT

All Bushing and Sprocket tapers are machined with integrated and matched tooling, to avoid possible variation from random production. There is no risk of a "rocking" fit. SHOLD-A-GRIP gives you fast, free interchangeability, over the entire size range.

High-strength Design

BY BOSTON Gear EXPERTS

Because of the unique, patented SHOLD-A-GRIP construction, holes for screws are in the shoulder. There are no weakening holes in the sprocket itself. BOSTON Gear quality throughout assures longer service life on your toughest drives.

Completely engineered and manufactured by BOSTON Gear . . . for 75 years the leading specialists in Stock Gear and Sprocket design.

Complete information on SHOLD-A-GRIP Bushings and Sprockets is available from your Boston *Gear* Distributor, or write Boston Gear Works, 62 Hayward St., Quincy 71, Mass.

ASK YOUR NEARBY

BOSTON Gear®

DISTRIBUTOR

UNIVERSAL JOINTS • COUPLINGS • BALL BEARINGS • OVER 5000 STOCK ITEMS

Henry P. Cowen, President of MacGregor Golf Co., Cincinnati, Ohio, asks an unusual question:

"Which club is worth $8,000?"

"Jack Burke was teed off!

"He was leading the Texas Open after two red-hot rounds. Then a souvenir-hound stole a custom-made 11-iron from his bag. Without that MacGregor 'Double Duty' iron, he was in trouble!

"He sent us a desperate telegram at Cincinnati. We called Air Express — and a duplicate club was in his hands the next morning!

"He went on to win the Texas Open and three more tournaments in quick succession. His new MacGregor 11-iron (6th from the right) was worth $8,000 in prize money — thanks to Air Express!

"Jack and our other staff professionals are the 'proving ground' for MacGregor golf equipment. Keeping these famous players supplied as they move from tournament to tournament could be a tough job. But Air Express reaches them quickly—wherever they are.

"Demands of tournament committees, pro shops and retailers keep us calling on Air Express day in and day out. Air Express has never failed us. Yet costs on most of our shipments are actually *lower* than other air services.

"We save money by specifying the fastest service — Air Express!"

It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

AIR EXPRESS

GETS THERE FIRST

via U. S. Scheduled Airlines

You Pay More For HEAT-FAG...

...than for the blower that keeps men cool

When hot, stagnant or fume-filled air distresses your men, your production suffers too.

Give men around furnaces or hot processes, or in confined areas, a steady supply of fresh, cool air with Coppus Blowers and Exhausters and watch their efficiency jump to a more profitable level.

There's a portable, easily adaptable Coppus "Blue Ribbon" product for practically any fresh-air requirement. The Coppus "Blue Ribbon" is the sign of precision workmanship and trouble-free, long-lasting operation. Check and mail the coupon for exact information. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, BEST'S SAFETY DIRECTORY, MINING CATALOGS.

OTHER
COPPUS
"BLUE RIBBON"
PRODUCTS

HORIZONTAL TURBINE
Six frame sizes
1 to 150 horsepower

VERTICAL TURBINE
Six frame sizes
1 to 150 horsepower

FANMIX GAS BURNER

FANMIX GAS-OIL BURNER

MAIL THIS COUPON To Coppus Engineering Corp., 108 Park Avenue, Worcester 2, Mass.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets; etc., after treated with coating material.

NAME.....

COMPANY.....

ADDRESS.....

CITY.....

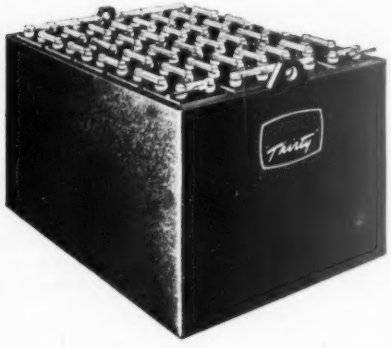
(Write here any special ventilating problem you may have.)

EXTRA LOAD-CARRYING CAPACITY

THANKS TO BATTERY POWER!

Battery-power keeps modern industrial trucks on the move . . . enables each truck to make *extra* trips per shift . . . *moves more tons at lower cost.* Today's trucks lift higher, maneuver faster, turn shorter and accept a wider range of attachments to meet today's materials handling requirements. Gould battery power gives you extra capacity for these versatile units. For industrial trucks, there's *no* power like Gould Battery power.

Specify
THE GOULD "THIRTY"—
America's Finest
Industrial Truck Battery



GOULD INDUSTRIAL BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

©1953 Gould-National Batteries, Inc.

How would YOU control costs here?

1. SOFTBALL MANUFACTURING COSTS are dependent on obtaining absolute product uniformity. Most difficult and important part to control is the kapok core. H. Harwood & Sons, Inc., of Natick, Mass. solved this problem by welding the cores under hydraulic pressure at closely controlled high temperature. Two inexpensive THERMOSWITCH units per mold provide the needed temperature control at low cost.

2. SAVED $17,975 S-T-R-E-T-C-H. Pre-stretching under high heat is the only way of making Nylon fish line that won't stretch and shrink. One manufacturer was quoted $18,000 for complicated control equipment. Instead — and very successfully — he stretches the line in a heated die, temperature-controlled by a Fenwal THERMOSWITCH. Cost, less than $25!

3. THIS IS IT — the Fenwal THERMOSWITCH control is simple — compact shell contracts or expands *instantly* with temperature changes, opening or closing electrical contacts. Adjustable and highly resistant to shock and vibration. Fenwal THERMOSWITCH units are helping cut costs and improving production throughout all industry.

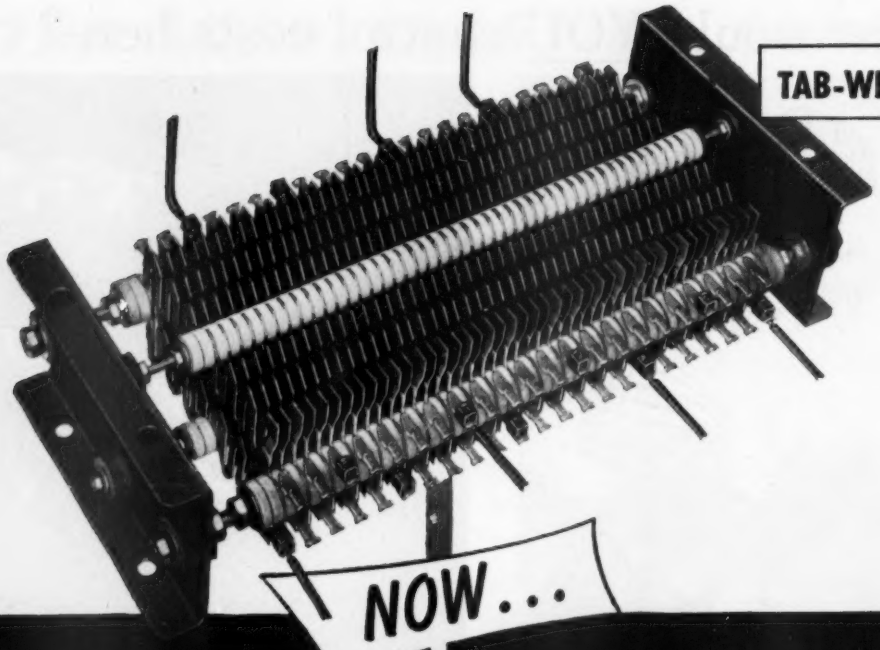
4. SEND FOR THIS NEW CATALOG for complete explanation of the unique THERMOSWITCH unit. Also ask for more detailed, illustrated discussions of the problems above. Fenwal engineers will be glad to help you solve your temperature control problems involving heat, humidity, radiant heat, pressure and other variables. Write **Fenwal Incorporated, 68 Pleasant Street, Ashland, Massachusetts.**

Fenwal

THERMOSWITCH®

Electric Temperature Control and Detection Devices

SENSITIVE . . . but only to heat



NOW...

A COMPLETE LINE OF

WELDED RESISTOR SECTIONS

up to 150 amperes continuous capacity without internal paralleling

No Crowding . . . 3/8" to 3/4" spacing between grids in EC&M Types TW and TW-X Sections

In both styles of EC&M Welded Plate Resistor Sections, heat radiation is *efficient*. Spacing between grids is a minimum of 3/8" on the smallest grid size up to a 3/4" maximum on the 150-ampere continuous capacity section.

Likewise efficiently designed are the individual grids, resulting in completely covering a plant's requirements with a *minimum* of sizes.

Remember, also, these EC&M TAB-WELD Resistors may be used "off-the-storeroom shelf." Many taps make on-the-job connections easy and readily permit small adjustments in resistance-value.

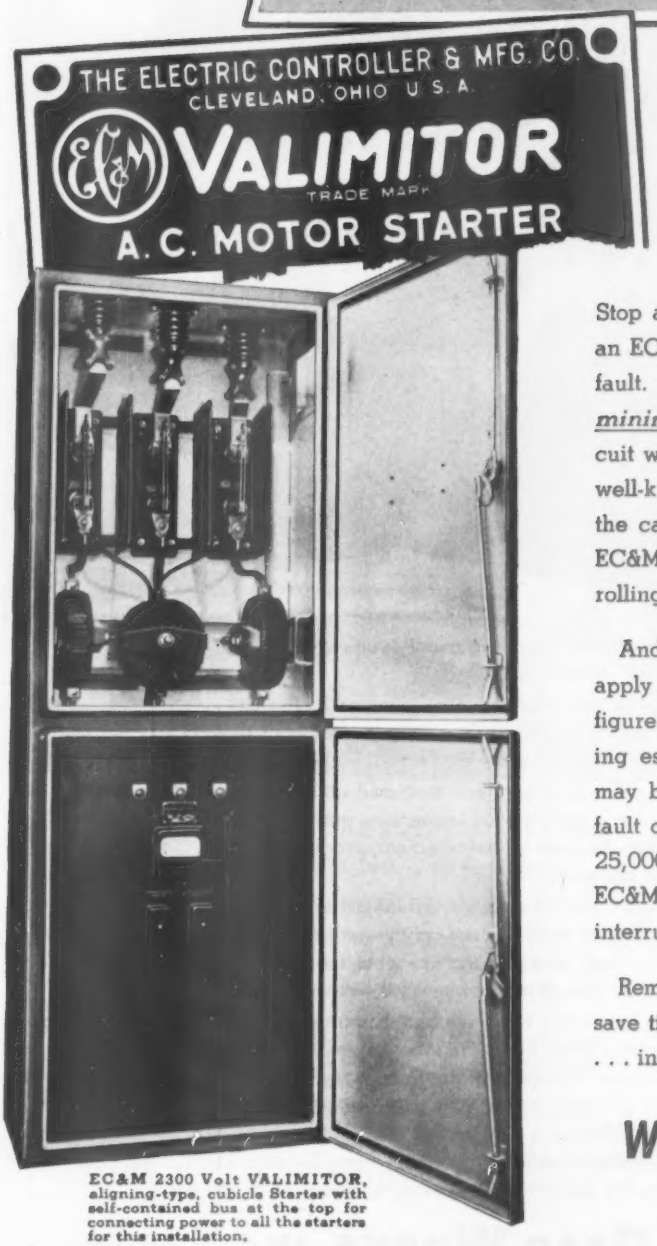
SPECIFY EC&M BULLETIN 942 EC&M TAB-WELD RESISTORS

E C & M

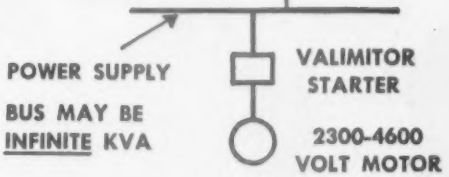
THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

RESTART in a matter of seconds -- no parts to replace --PAYS for itself, if there's ONE FAULT



EC&M 2300 Volt VALIMITOR, aligning-type, cubicle Starter with self-contained bus at the top for connecting power to all the starters for this installation.



Stop and consider the reduction in down-time an EC&M VALIMITOR Starter will *save* after a fault. Damage in the motor circuit will be *minimized* by the VALIMITOR coils—the circuit will be cleared *quickly* and *safely* by the well-known Type ZHS magnetic contactor. When the cause of the fault has been remedied, the EC&M VALIMITOR starter will get production rolling again in a matter of seconds.

And EC&M VALIMITOR Starters are easy to apply on a system of *any* capacity. No need to figure "short" capabilities of existing bus including estimate for future growth. These starters may be applied to a bus of infinite KVA . . . fault currents will be limited to a maximum of 25,000 KVA (steady state current) and the EC&M Type ZHS Contactor of 50,000 KVA interrupting capacity clears the circuit quickly.

Remember that EC&M VALIMITOR Starters save time . . . in application . . . in installation . . . in restarting after a fault.

Write for **T9-117**

Reprint Bulletin

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

"What's so unusual about miking a gear?" you may ask.
We'd have to answer, *"Nothing . . . in most cases."*

• But when we talk about miking the pitch diameter over wires, of a big case hardened spur gear which must have a Rockwell hardness of 60, and be held to a very close tolerance, we get down to the finer art of gear making.

• BRAD FOOTE has made tens of thousands of the gear illustrated above, on a long contract run. They are subject to rigid customer inspections, and the percentage of acceptance is exceptionally high. Because of few rejections, production costs are lower. So are the costs to the customer.

• Making gears today is no ordinary job. It's a highly specialized business with new techniques that far outdistance methods used only yesterday. Many of these techniques leave no mark visible to the eye when the gear is first examined. But as the service life increases, the value of modern methods becomes apparent.

• Here at BRAD FOOTE we employ every new technique and modern method that has been proved to increase the life of the widely diversified gears, gearmotors, reducers, and transmissions which we design and manufacture. That's why you can order from us with confidence that our products will serve well in your shop or plants, or on the equipment you make for others.

• Avail yourself of the complete facilities and services offered only by BRAD FOOTE. Send your specifications for quotations, or tell us about the job and let us design what you need.

BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • OLympic 2-7700

subsidiaries

AMERICAN GEAR & MFG. CO.
Phone: Lemont 920
Lemont, Illinois

PITTSBURGH GEAR COMPANY
Phone: ATlantic 1-9950
Pittsburgh 22, Pennsylvania

All power trucks lift, move and stack

BUT ONLY YALE GAS TRUCKS HAVE FLUID DRIVE

Smooth, trouble-free Fluid Drive gives you 3 to 8 times longer clutch life... saves costly, work-stopping clutch repair and too-frequent replacement.

Less down time is just one of the big advantages of Yale-exclusive Fluid Drive. You get continuous, stall-free operation ... smoother stops and starts to protect your load as well as your operator.

Other Yale Gas Truck features ... many of them exclusive ... include rugged 65 HP Industrial Engine—safer, surer Automotive-type Brakes—Shockless Steering—Hypoid Gears.

Yes, YALE Trucks and attachments lead in money-saving efficiency ... cut costs as much as 75% in industries everywhere. And, every Truck YALE makes ... Gas, Electric, Diesel, LP-Gas or Gas-Electric ... is subject to rigid Quality-Control checks at every stage of manufacture.

YALE*

MATERIALS HANDLING EQUIPMENT

*Registered trade mark

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 38
Roosevelt Blvd. and Haldeman Ave., Phila. 15, Pa.

☐ Please send my free copy of *Picture Story of Yale Materials Handling Equipment.*

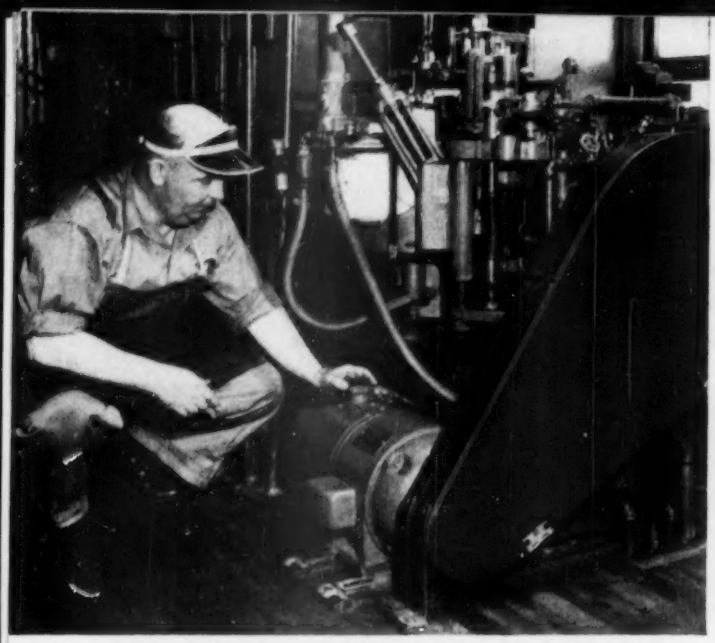
Company_____

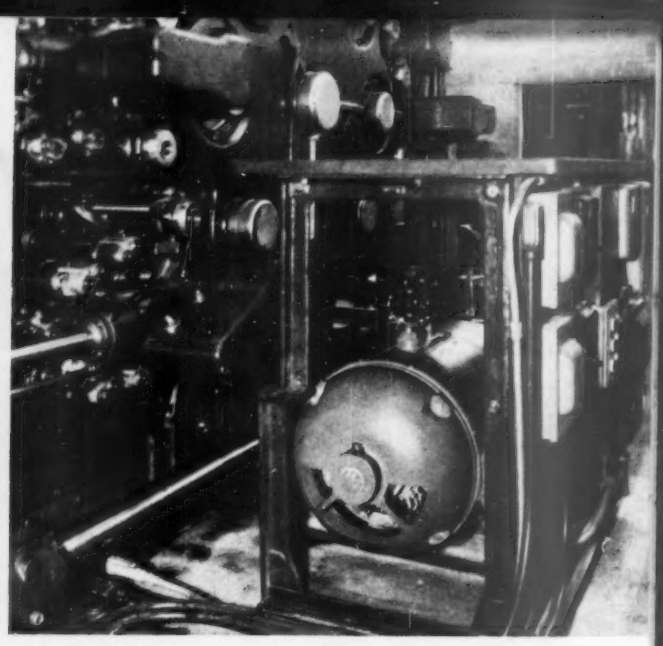
Name_____ Title_____

Street_____ City_____ State_____

In Canada write: The Yale & Towne Mfg. Co., St. Catharines, Ontario, Canada

Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

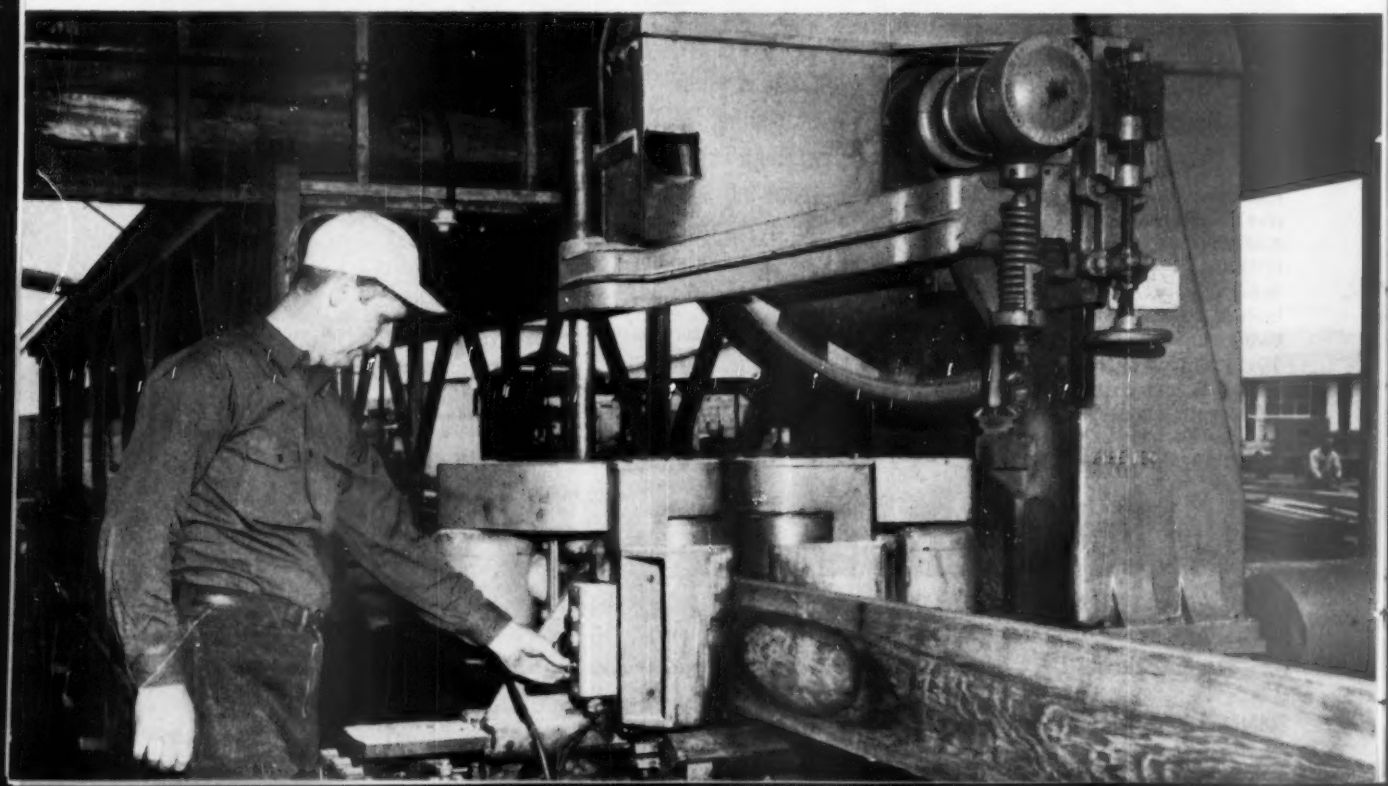


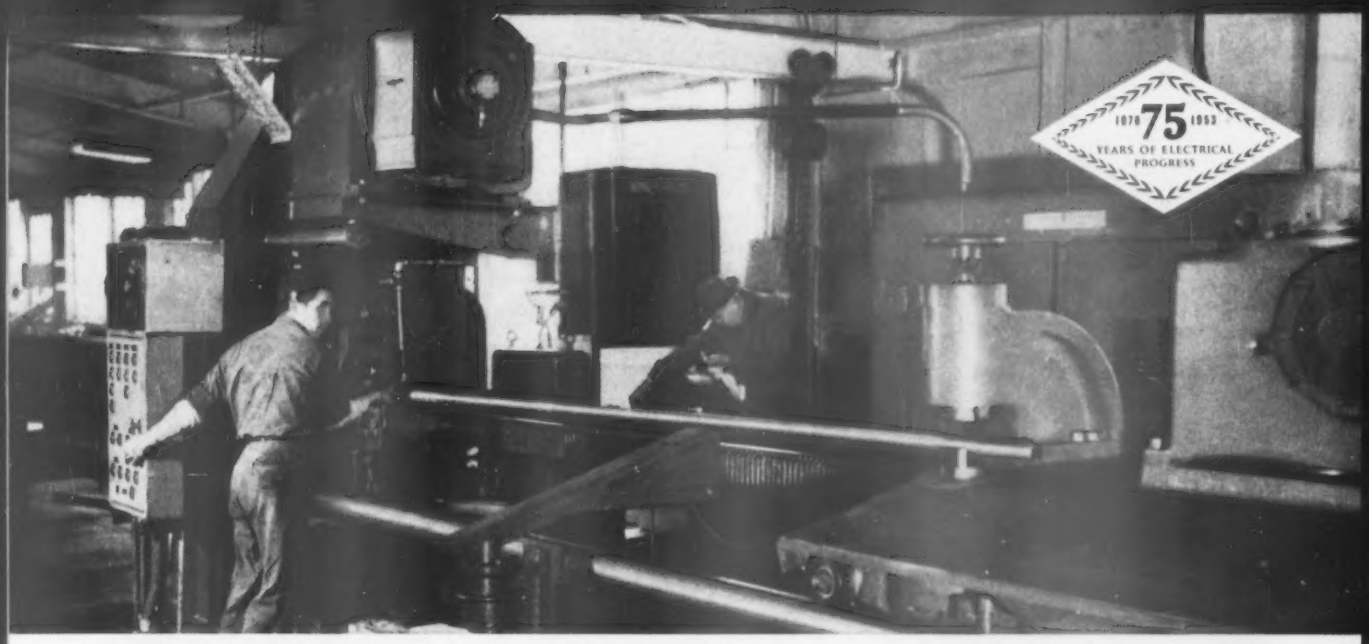


G-E ACA MOTOR as applied on a monotype casting machine in the plant of the Los Angeles Examiner (left) and as the main drive on a five color press in the plant of the Kansas Color Press, Lawrence, Kansas. The G-E ACA motor is your simplest and most economical electrical adjustable-speed drive. You get stepless speed adjustment directly from AC power over a 3 to 1, 6 to 1, and 20 to 1 range. No external conversion equipment is necessary. For additional information, check the coupon for Bulletin GEA-4833.

How a G-E Adjustable-speed Drive

G-E THY-MO-TROL® DRIVE at the San Jose Lumber Sales and Milling Company, San Jose, California, enables the operator to vary the speed of the resaw feed roll from 8 ft. to 250 ft. per minute. G-E Thy-mo-trol Drive can be made to hold speed regulation as close as ± ½%. It is available between 1/40 and 75 horsepower and offers smooth, stepless speed adjustment ranging up to 100 to 1. G-E Thy-mo-trol is easy to install, maintain, and operate. For complete information, check Bulletin GEA-5337 in the coupon at right.





TWO G-E SPEED VARIATORS, one of which drives the cutter-head and the other the bar-feed on this installation at the Allegheny-Ludlum Steel Co., Watervliet, N. Y. G-E Speed Variators are available in ratings from 1 to 200 hp, with excellent speed regulation and in speed ranges up to 40 to 1. With the addition of an amplidyne or electronic regulator, the Speed Variator will give you even closer speed regulation. The packaged power unit is easy to maintain, easy to move to new locations. Ask for Bul. GEA-5335 and 36.

can increase your production!

G-E ADJUSTABLE-SPEED DRIVES mean accurate, stepless motor speed control . . . the chance to improve the versatility of your present machinery . . . increase your production. With a G-E Adjustable-speed Drive you can reduce waste . . . improve product quality.

G-E ADJUSTABLE-SPEED DRIVE WILL ENABLE YOU to produce a greater variety of goods . . . for with the flexibility of adjustable motor speeds you can greatly diversify your product output. Fundamental speed adjustment is available from the G-E ACA motor which is controlled by a simple twist of the dial . . . precise speed control can be obtained with the G-E Thymo-trol drive or Speed Variator. Whatever your need, there is a General Electric Adjustable-speed Drive for you . . . packaged drives are available from 1/40 to 200 hp . . . speed ranges from 3 to 1 up to 100 to 1.

TO GET COMPLETE INFORMATION consult your nearest General Electric Apparatus Sales Office. Your G-E Sales Representative will be glad to recommend the most economical drive best suited for your operation. For printed information on the complete line of G-E Adjustable-speed Drives, use the coupon.

*Reg. Trademark of the General Electric Company.

You can put your confidence in—

GENERAL ELECTRIC

LET G.E. HELP YOU PICK THE RIGHT DRIVE

Because only General Electric makes **all major types** of electric adjustable-speed drives, it is best qualified to help you select the **right drive.** Send for these informative bulletins.

☐ **A.** This 26-page manual describes **all** four types of drives and where to apply them. Bulletin GEA-5334.

☐ **B.** Lower cost, simplest a-c drive. Bulletin GEA-4883.

☐ **C.** More flexibility, moderate cost. Bulletin GEA-5335.

☐ **D.** Top performance, 1/40—75 hp. Bulletin GEA-5337.

☐ **E.** Top performance, 1–200 hp. Bulletin GEA-5336.

General Electric Company
Section L, 646-23
Schenectady 5, N. Y.

Please send me the bulletins checked
☐ for reference only
☐ for planning an immediate project

NAME .....
COMPANY .....
ADDRESS .....
CITY ..... STATE .....

(Photograph Courtesy Canadian National Railways)

Vacationing?

Stop in to see us, if you pass our way

Whether you head for the Golden Gate, the Great Lakes region or the Atlantic Coast, you're almost certain to pass within hailing distance of a Ryerson plant on your vacation this summer.

If you are in the vicinity of any of the fifteen Ryerson plants strategically located across the country from Boston to Spokane —we would be happy to have you drop in for a visit. Bring your wife along, so she can see what you mean when you say "immediate steel." The ladies, too, seem to enjoy going through a steel service plant.

And remember, while you're away from your desk we will make a particular effort to meet the steel needs of your associates when they call.

Have a grand vacation! And again—stop in for a visit if convenient.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

RYERSON STEEL

PRINCIPAL PRODUCTS: CARBON • ALLOY • STAINLESS STEELS • BARS • STRUCTURALS
PLATES • SHEETS • TUBING • 4-WAY SAFETY PLATE • CHAIN • WIRE ROPE, ETC.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Industrial production is going back to a normal seasonal pattern for the first time since 1939. July was a vacation month. The industrial production index fell to about 230, from 241 in June. It will be up again in August, but not to the June level. We're still in the summer doldrums.

•

Most people forget that pre-war factory output was lower in many industries throughout the second half-year, not just in vacation months. In 1939 automobile output was divided 55%-45% between the first and second half-years. Although car sales were highest during the spring months, production of new models started in the fourth quarter. In other pre-war years, new models were held off till January. Fourth quarter was the customary change-over time.

Most industry observers think automobile production has filled the backlog demand that maintained output in the last half of 1952. They see a return to the old seasonal pattern coming up. Car production in the first half of 1953 was 3.3-million. A return to the 1939 seasonal pattern would mean 2.5-million cars from July through December. Production might start to pick up in the last two months of the year if some makers introduce their new models early—as they did in 1939.

•

Since the automobile companies purchase about 20% of all finished steel, the return to a seasonal pattern will affect the steel industry also. In 1939, steel production followed a seasonal pattern of 41%-59% between the first and second half.

Since the war no seasonal pattern has appeared in steel. Instead, strikes and the requirements of the defense program have led to capacity operation most of the time. But with the military build-up leveling off and auto production returning to a seasonal pattern, steel is certain to display some seasonal ups and downs, too.

•

We don't know whether steel will return to the same seasonal pattern as before the war because we don't know enough about the combined effect of the various users of steel. The relative importance of different steel users has shifted materially since the war.

Appliance makers, for instance, now take more steel than they used to. Construction, on the other hand, probably takes less. But steel men figure autos and construction are still important enough to mean some seasonal letdown this fall.

Most non-durable industries follow a seasonal pattern, too. The best example is food processing. September is always a big month. Canning activity in September last year was about 220% of the average for the year. In March it was only 60%. Wide seasonal swings also occur in output of containers, tires, and petroleum products.

•

Textiles are a different story. No seasonal pattern has emerged since the war in the textile industry. Instead, the industry has been characterized more and more in recent years by irregular swings resulting from variations in market demand. However, before the war, textile production also followed a seasonal pattern. Output of textile mills tended to be high in the fourth quarter in preparation for the Easter season.

•

In recent months some industry observers think that there are again signs of a regular pattern of ups and downs in textiles. But the experts believe any new seasonal pattern may be different from pre-war. They think it may be high in the first quarter instead of the last.

This is important to many plants supplying the textile industry. It currently takes about 20% of the chemical industry's output, as well as large quantities of packaging materials, machinery, and parts.

•

For industry generally, the return to seasonal patterns is likely to coincide with a moderate downturn in the long-term business cycle. The slide will look a lot worse to industries hitting their seasonal low at the same time.

More seasonals in production mean more variations in shipments for plants that supply materials and components. They mean more inventory problems all around. It's part of the bigger problem of scheduling production to meet changeable consumer demand—the swing to a buyers' market.

LOOKING AHEAD IN LABOR

Last minute round-up as we go to press

Look for Walter Reuther to pull something dramatic in the next six months. CIO's star is falling, fast. AFL's is rising. Reuther will try to do something about this,

It could be merger with AFL. Or a complete break. Reuther might start a third political party. Or take a stronger hold on the Democratic Party. One thing is sure: CIO will attack Eisenhower more and more as elections roll around.

•

CIO has troubles. It is drawing farther away from the Eisenhower Administration while AFL moves closer. This means CIO has less influence in government policies, AFL more. Times have changed.

CIO has trouble with AFL, too. A dozen CIO brewery worker locals have switched to AFL teamsters. CIO packinghouse workers have talked merger with AFL's meat cutters. Smaller CIO unions are exploring merger prospects with larger AFL rivals.

And CIO has trouble within its family. The steel workers go their own way now that Reuther has replaced Philip Murray as CIO president. The new steel union boss, David McDonald, worries Reuther by his secret meetings with John L. Lewis and other powerful union leaders.

Steel workers won't merge with the miners or start a third labor federation. But any cooperation among Reuther's foes — and he has many — can hurt the CIO chief. CIO would fall apart if the steel workers pulled out.

•

AFL has taken over the Labor Dept. Add to Secretary Durkin and Under Secretary Mashburn a new assistant secretary with an AFL backgound. He is Spencer Miller, Jr., former head of AFL's Workers' Education Bureau. Another new assistant secretary, H. C. Hobart, from the Brotherhood of Locomotive Engineers, is "AFL minded," too.

Durkin still wants an assistant secretary from industry. M. M. Olander of Owens-Illinois Glass said no—for "personal" reasons. CIO refused to back down on its choice of John W. Edelman for assistant secretary. The White House rejected the textile union lobbyist because he's a socialist.

Reuther may have planned it that way. He prefers less association with the Administration so he can criticize more freely. CIO has not participated, for instance, in White House discussions on Taft-Hartley amendments. AFL attorneys have played a big part, as has Durkin, of course.

•

Nobody will be satisfied with the Taft-Hartley amendments coming out of the White House. Mostly compromises. Industry will criticize them as going too far; labor, not far enough.

Most significant will be reorganization of National Labor Relations Board. Board will be seven members, instead of five. More important, independent administrator will replace general counsel. Thus judicial and prosecution functions will be distinctly separate. Just what Taft wants.

T-H revision goes over until next session. Even so, Eisenhower will likely have his own majority on NLRB by fall. Already he has named a new chairman, Guy Farmer. John Houston's term expires this month. Paul Styles quits next month.

Farmer is conservative enough to satisfy Taft, yet acceptable to Democrats and labor. He served seven years in various legal posts with NLRB before 1945. He has been a partner in the Washington law firm of former Secretary of Defense Louis Johnson.

•

Whitley P. McCoy, Alabama law school professor, is the new Federal Mediation and Conciliation Service director. He favors keeping FMCS out of Labor Dept., will go slow on changes. Mild manner, meekness may prove handicap as country's top mediator.

McCoy has been permanent umpire under Goodyear, International Harvester, American Thread and other labor contracts. Some companies thought he called 'em wrong. Taft, however, found nothing in his decisions to make him unacceptable.

•

More fringe wage benefits may be taxed as income. Treasury Dept. is taking a good look at benefits like free lunches, discount allowances, and medical services, all tax exempt. Primary object is to clarify tax rules, but some new taxes might result.

SEE PRACTICAL LABOR RELATIONS, PAGE 204

NOW More Efficient, Lower-Cost Air Cleaning for Your Plant

Revolutionary PLIOTRON Filter by Goodyear Makes Air 400% Freer of Fine Dust, Dirt, Soot!

HERE's a revolutionary new filter unit—replacement for either ordinary throw-away or standard cleanable units—that assures your plant or factory a constant supply of super-clean air—at low cost. It's the new PLIOTRON by Goodyear—that outperforms all except the costliest electronic filters—now available for both air conditioning and heating systems.

Here's how PLIOTRON works: the filter is made with a material having a natural charge of static electricity. This charge—as proved in laboratory and field tests—attracts and captures five times as many tiny dust particles as ordinary filters—even as small as 1/100th the diameter of a human hair. This means PLIOTRON removes *more* fine dust—*more* fine dirt—makes factory, store, building and home air healthier, cleaner. PLIOTRON will definitely reduce cleaning bills, decorating bills—and will insure cleaner air in processing plants.

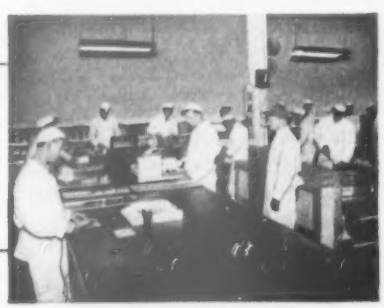
What About Cost? SURPRISE!

PLIOTRON costs more than ordinary throw-away filters which should be replaced every few weeks or months. But it costs far less than electronic units now in use in many plants to produce similar cleanliness in the air. And PLIOTRON can be quickly and easily cleaned—gives years of service without replacement.

Wherever you need clean air, there's a place for PLIOTRON in your heating or air conditioning equipment. Ask your heating and ventilating contractor, see your hardware supplier, or write Goodyear, Pliotron Sales, Dept. FM, Akron 16, Ohio.

Here it is—the new PLIOTRON that means cleaner air at lower cost. Fits all standard-size filter holders in heating and air conditioning systems.

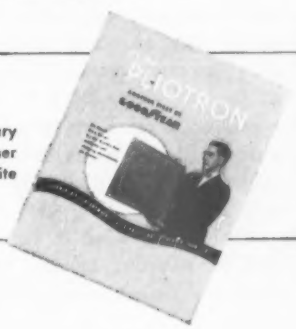
Lasts for years—easily and quickly cleaned. Can be returned to duty without waiting for it to dry.



Factories, shops, stores, office buildings cut cleaning costs, save on labor—reduce dirt and dust-caused losses with PLIOTRON.

GET THE WHOLE STORY TODAY!

Send for your copy of this new booklet on the revolutionary PLIOTRON Air Cleaner. See how it will provide for you, "Cleaner air for anywhere—at a price that's cheaper than dirt". Write Goodyear, Pliotron Sales Dept. FM, Akron 16, Ohio.



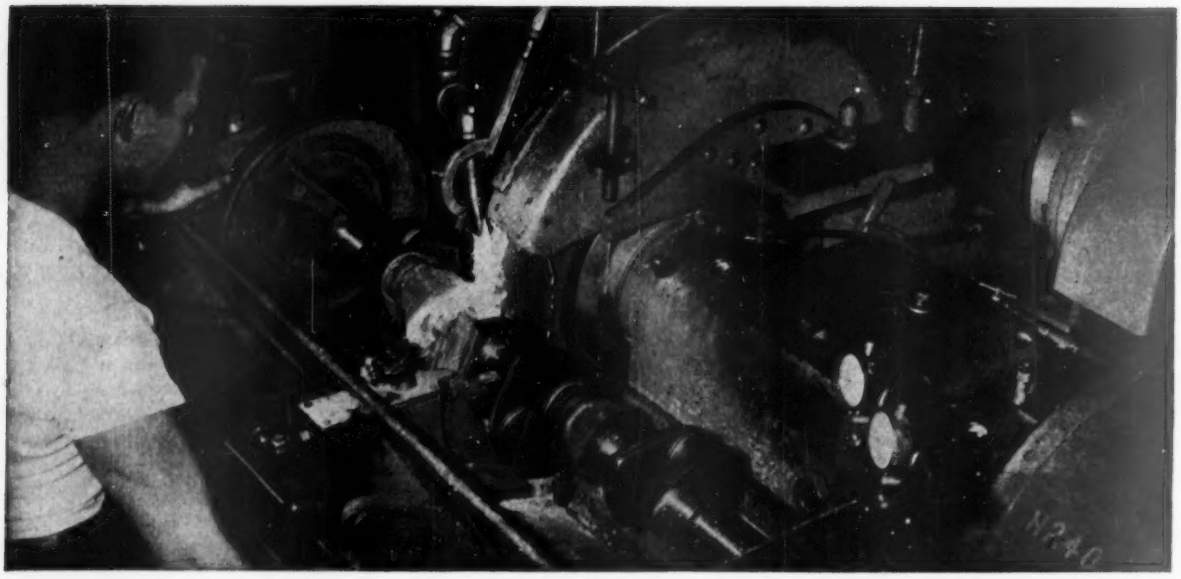
PLIOTRON
AIR CLEANER
by GOODYEAR

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

Pliotron—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

"TEXACO LUBRICATION ENGINEERING SERVICE IS REALLY 'ON THE BALL'"

—Norman Nesbitt, Purchasing Agent, Atlas Crankshaft, Inc., Fostoria, Ohio



ATLAS CRANKSHAFT, INC., takes pride in the fine quality of its products — and whatever helps to maintain that quality is highly prized. That is why Atlas has been using *Texaco Soluble Oil* in its grinders for a good many years — getting fine results in finish, rust prevention, emulsion stability and cleanliness.

But Atlas is particularly pleased with the service that goes with Texaco products. Mr. Norman Nesbitt, Purchasing Agent, writes:

"A Texaco Lubrication Engineer calls on us regularly and confers with our engineers and operators. When, a couple of years ago, our water condition changed, your engineer got together with ours and recommended changing from *Texaco Soluble Oil D* to *Texaco Soluble Oil HW*, to avoid possible adverse effects from increased water hardness. We followed his advice and have continued to get fine results.

"This is the kind of foresightedness in stopping trouble before it starts that makes me say that Texaco Lubrication Engineering Service is really 'on the ball'. We appreciate it, as I am sure your other customers do."

Skilled Texaco Lubrication Engineering Service is famous everywhere. Put it to work in your plant — along with *Texaco Cutting, Grinding and Soluble Oils* — and step up production, reduce unit costs.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

FACTORY MANAGEMENT AND MAINTENANCE

HARRY LEE WADDELL, EDITOR

Organization Is Still a Big Problem

THERE ARE TWO KINDS of organization problems bothering operating executives these days.

One is impersonal—the problem of organizing a plant, department, or section so it operates with top smoothness and efficiency.

The other is personal—the problem of organizing your own affairs so you can operate as an executive with top smoothness and efficiency.

How do FACTORY's editors know these are bothersome problems? Readers tell us so—in person, by letter, and by deeds in their plants.

Impersonal organization is Problem No. 1 . . .

Much has been written and spoken about plant and departmental organization. Yet every once in awhile we visit a plant where no one has ever bothered even to put together an organization chart. Certainly an organization chart is no guarantee of miraculous improvement in plant operation. But at least it indicates that an essential first step has been taken to clarify lines of authority and functional responsibility.

Lest the great majority of readers who have organization charts feel complacent, here's another point that often crops up:

Like the plant itself, and its equipment, the organization chart needs good maintenance—sometimes outright replacement.

Just shifting names to fill holes on a chart will do no good if your company is at the point where a whole new look at the organizational plan is needed. Many factors can make such a new look important—new product lines, new processes, increased volume, new markets. These factors all affect the plant operating executive's job. He can do it better with the right organization plan.

The solution? One answer is a regular practice of evaluating plant and departmental organization charts in the light of actual performance records. Having trouble meeting schedules? Is quality off? Is scrap high? Can you trace these or other troubles to confusion over lines of authority and responsibility? You sometimes can. For example—right from FACTORY's pages (Feb. 1953, p. 104)—Parker Appliance cleared up a whole batch of production headaches by a simple decentralization plan. Decentralization is not always the answer, of course. The only way to find out is to let your own problems dictate the kind of solution needed.

. . . but what about personal organization?

Here is where literally hundreds of executives tell us they face their biggest frustrations and headaches. A major problem, for example, is simply how to get set up so that the hours in the day are sufficient for the jobs to be done. One FACTORY article ("You Can Use Your Time Better," Feb. 1953, p. 84) has brought in some 4000 requests for reprint copies from harried readers.

In addition to making better use of their time, executives want to get better organized in other ways, too. Old concepts of "line" and "staff" don't always seem to hold up these days, or to work as well as they used to. How can they, when in some highly mechanized industries today some of the old "staff" functions like plant maintenance or engineering and research actually employ more people than the line production departments? How should important staff functions be delegated? To whom? How shall performance be checked and followed up? These are just some of the personal efficiency questions executives ask today.

The solution? There's no simple answer to tough questions like these. Obviously the operating executive in today's fast-moving plant operations must pay more attention to making his time count. Obviously he must delegate more and more of the work he has to do—or run the risk of bottlenecks.

Probably the only meaningful answers to personal organization problems are the ones that the facts point up. What's happening in your department today? What troubles can you trace to your own failures to utilize time, to delegate, or instruct and supervise? These are the facts. They will tell you what you need to do—if you will let them.

IDEA 1 **COMBINATION PLATFORM AND CONVEYOR** permits two methods of handling at same truck dock (on four of nine docks). With patform raised, ribbed belt conveyor is exposed to carry incoming cases of empty bottles to washers. Pushbutton control lowers (and raises) platform to load trucks with palletized cases of filled bottles by "walkie" pallet truck. Equipment was designed by Mathews Conveyor Co., Port Hope, Ont. Truck turn-around time is about an hour.

IMPORTANT MATERIALS

IDEA 3 **ADJUSTABLE TRUCK DOCKS** (three docks) facilitate unloading and loading of palletized cases of "walkie" pallet truck. Level is adjusted to truck height by pushbutton. Fork lift trucks move palletized loads to and from the docks.

. . . from a brand-new beer-bottling plant that set out to get the most modern handling system that could be devised.

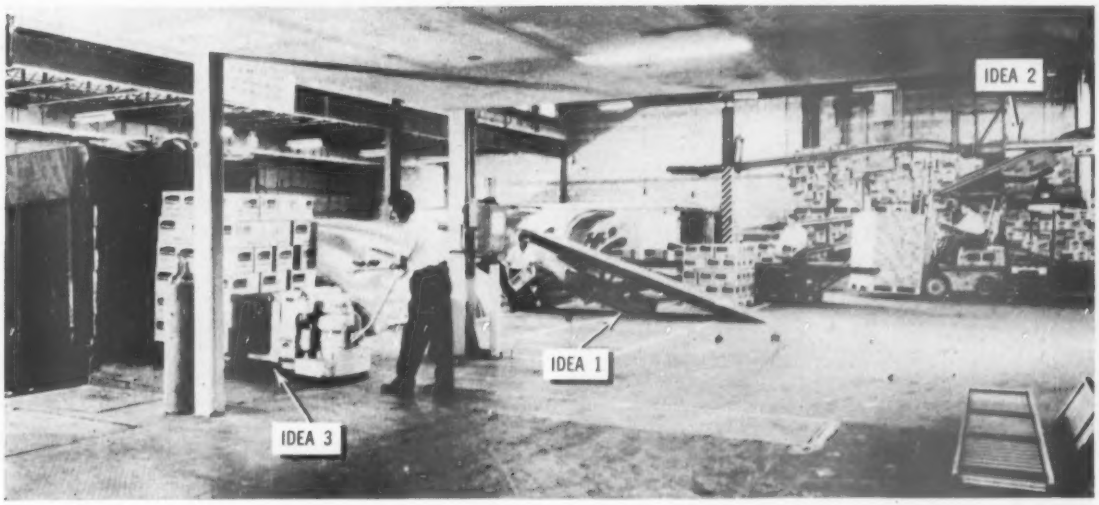
JOHN LABATT LIMITED built this new plant at London, Ont., to increase bottling capacity.

Advantages include faster bottling; direct flow of empty bottles to washing, with flexible conveyor or floor storage available; direct flow of filled bottles to truck or rail shipping or palletized storage; receipt of supplies on pallets and storage at point of use; better facilities to handle supplies and scrap; more automatic handling throughout the plant.

Shown on these two pages are three good ideas from Labatt's receiving and shipping department. For more ideas—from other departments—see the next four pages.

IDEA 2 **ADJUSTABLE CONVEYOR BOOMS** speed unloading of cases of empties and loading of unpalletized cases of bottled beer at same dock (on two docks). Labatt prefers palletized shipments, but some trucks (being replaced) won't take pallet loads; others serve non-pallet warehouses. Choice of arrangement of switching sections of conveyer (center) permits unloading to washers or storage, loading from production. Boom extension is adjustable; belts reversible.

HANDLING IDEAS...



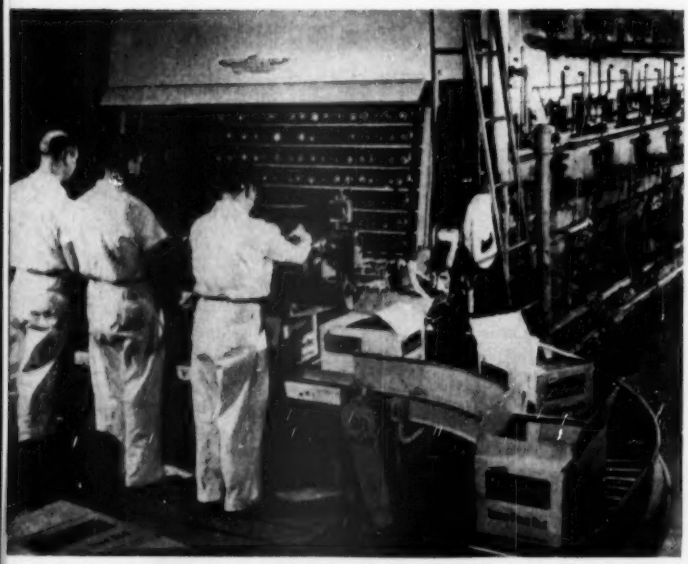
OVER-ALL VIEW SHOWS LOCATION AND INTEGRATION OF EQUIPMENT DESCRIBED IN IDEAS 1, 2, AND 3

Turn the page

SUPPLIES & SCRAP

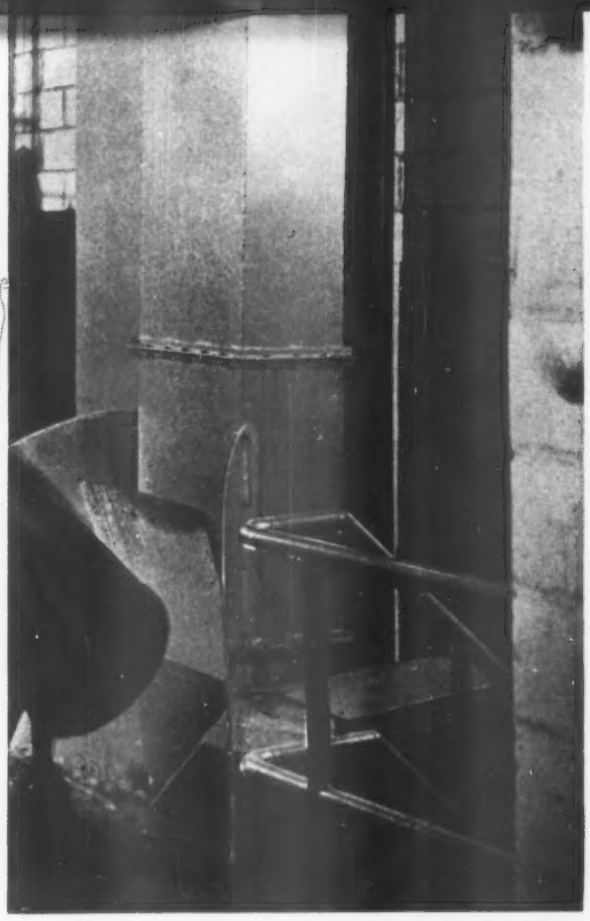
IDEA 4 **LOADING OVERHEAD HOPPER** on mezzanine with bottle caps eliminates loading at machine. Volume of work doesn't justify mechanization, but hopper makes manual work easier. A 2½-hour supply feeds down automatically.

IDEA 5 **BROKEN AND REJECTED BOTTLES** are this plant's scrap. Safe, convenient disposal is important, as is true of scrap in any plant. Labatt recognized the scrap disposal problem (sometimes overlooked in plant



IDEA 6 **CARTONS BRINGING EMPTY BOTTLES** into the plant create another scrap disposal problem. Operators remove bottle from cartons, inspect them, and feed

good ones into soaker. Rejected bottles are thrown into drum (see Idea 5) behind operators. Empty cartons are put on conveyor, move to baling operation (above). Two machines, fed



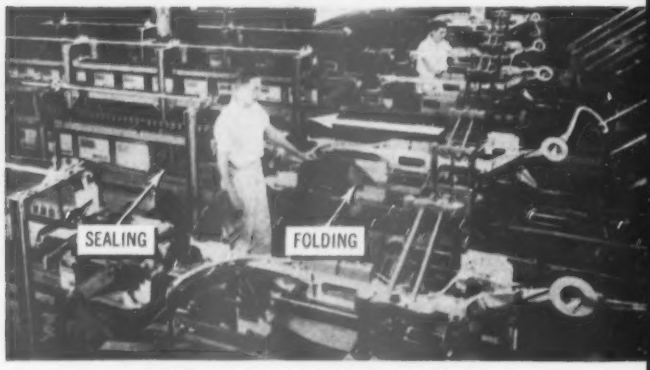
planning), set up a simple but effective method. Strategically located drums receive the bottles. A handler wheels them to this chute that feeds the glass into a crusher, and on into a hopper over a truck well. Special truck carries cullet away.

from above by switching conveyor, produce up to 46 1000-lb. bales per shift. Fork truck takes bales to scales for weighing, then loads them into boxcar.

PACKAGING

IDEA 7 **CARTON MAKE-UP MACHINE** is located off the main line. It opens the carton blanks, seals the bottoms, then sends them by conveyor to . . .

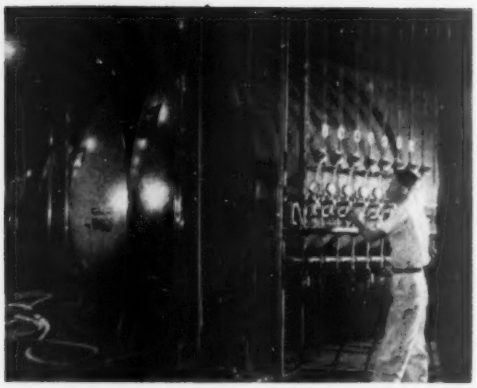
IDEA 8 **CARTON PACKING MACHINES** • Operators slide a pair of empty cartons into machine which fills them in one stroke. Operator pushes filled cartons over rollers to power conveyor which carries them to . . .



IDEA 9 **CLOSING AND SEALING MACHINES** • These machines automatically fold and glue carton tops, then close and seal them.

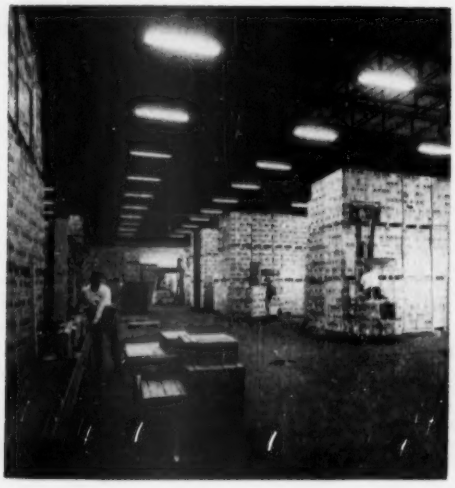
HANDLING IDEAS ... *Begins on page 76*

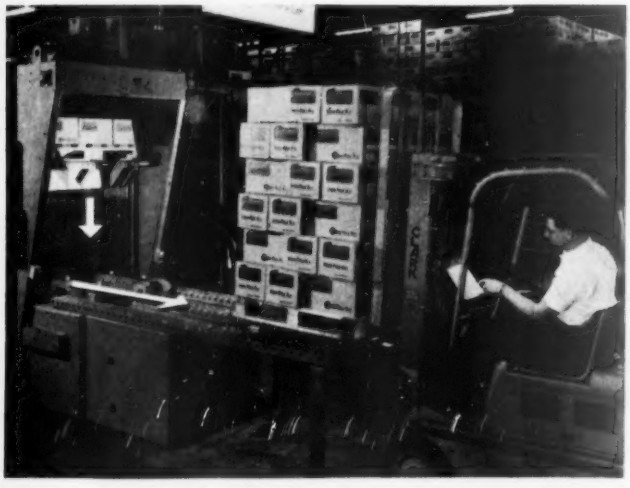
PROCESS HANDLING



IDEA 10 **ONE CONTROL MANIFOLD** permits operator to pump beer from brew house into glass-lined tanks, and supply three bottling machines on floor above (designed to support heavy machines).

IDEA 11 **SIGNAL LIGHTS TELL OPERATOR** how "traffic" is moving on chain-roller conveyer that moves empty bottles to three soaking machines. Limit switches in four separate conveyer blocks ahead control lights. Green indicates normal movement with space between blocks; white, conveyer filled, no gaps; red, line shut down by jamming of cartons, or by soakers. Rollers, attached to powered chains, free-wheel when cartons are stopped with power on. Elevating belt section (foreground) connects feed line with one of three tiers.

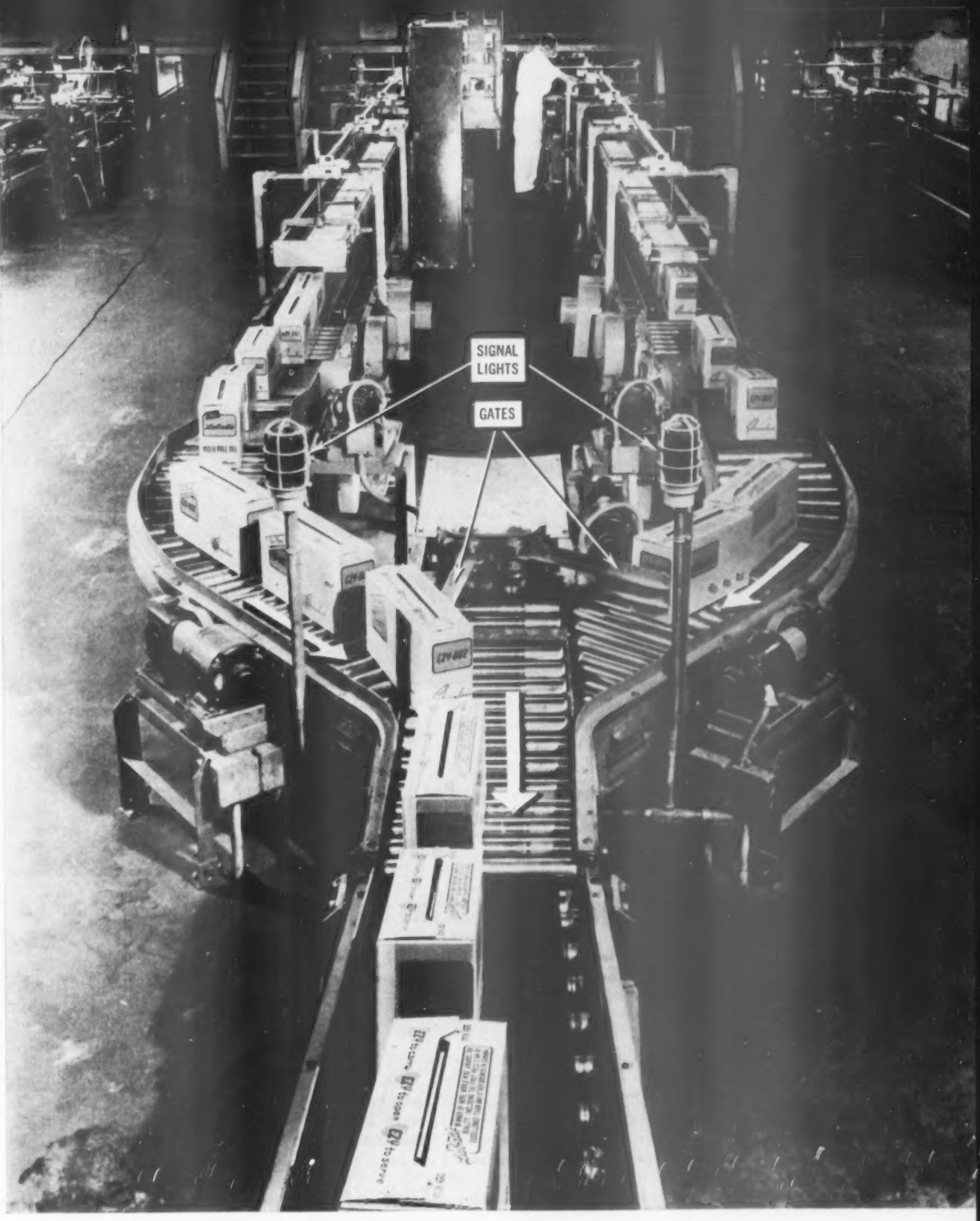




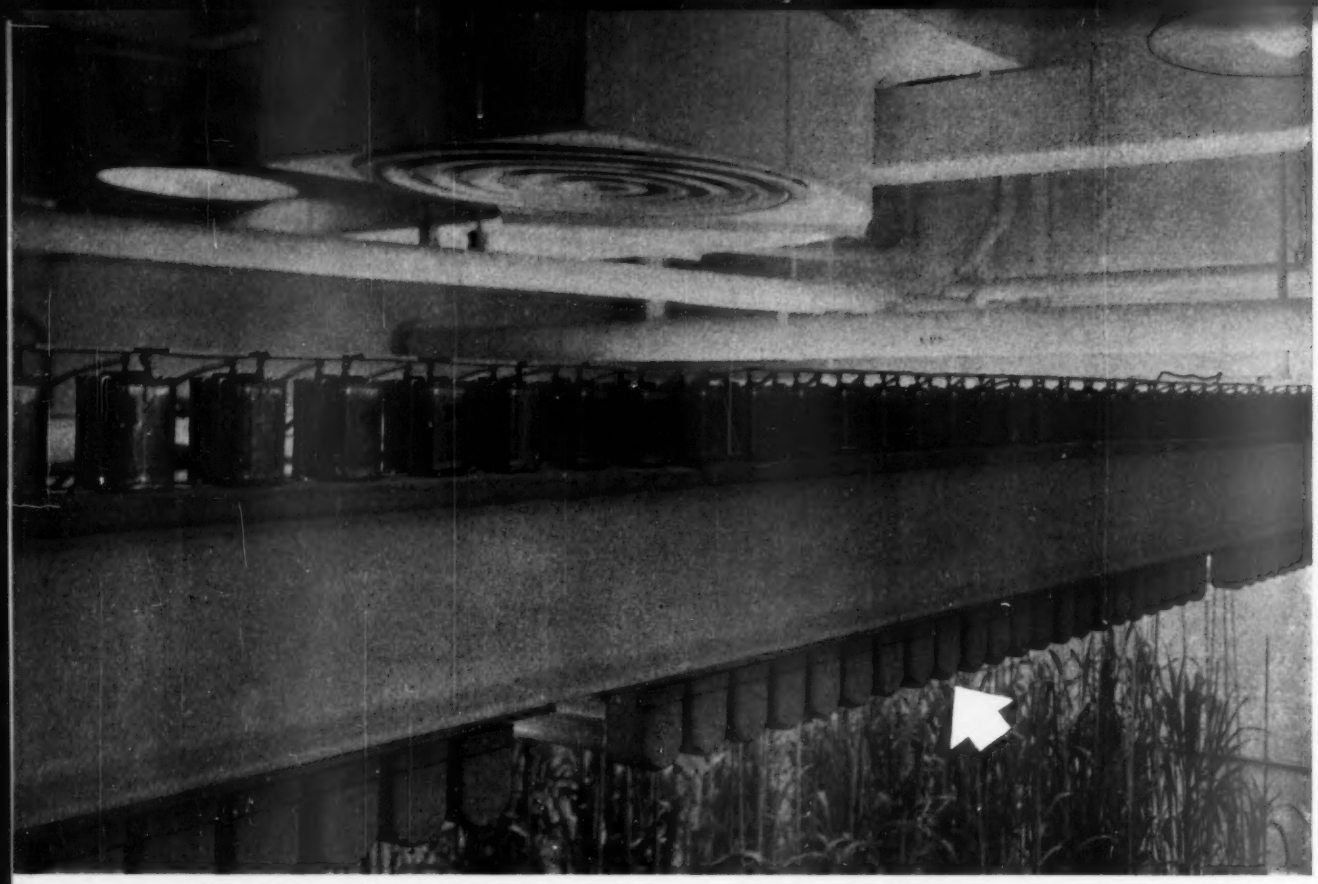
IDEA 12

MANUAL PALLETIZATION is used for lower-volume units. Fork trucks move pallet loads to docks for direct shipment, or tier them to more than 16 feet in storage. Counter on each conveyor registers production count on a master panel.

AUTOMATIC PALLETIZATION is used for larger-volume units, in three different sizes. Conveyors from packaging feed palletizer. Operator sets palletizing pattern on a control panel. Fork truck feeds stacks of pallets to palletizer, removes pallet loads. Palletizer positions pallet, stacks cartons, and ejects loaded pallet automatically.



IDEA 13 **AUTOMATIC GATES** act as "traffic cops," control convergence of cartons from two conveyors off packaging lines into one conveyor to warehouse. When a gate on one line is opened, a locking cam holds gate on other line closed. Interruption in flow of cartons from one line, plus contact with a switch on closed gate by a carton on closed line, automatically opens closed gate, closes and locks other. Signal lights tell operators which line is stopped. If required, conveyor from packaging can be directed to the rail car area or to the truck docks, for immediate loading.



YOU'RE LOOKING AT a significant installation of high-frequency fluorescent lighting. Arrow points to H-F fluorescents in U.S. Department of Agriculture's Plant Industry Station, Beltsville, Md. Low heat, low cost suggest factory use.

High-Frequency Fluorescents . . .

. . . may be the answer to your tough lighting problems

THE BELTSVILLE PROBLEM was to give the laboratory shown above 2000 foot-candles of light with a minimum of heat. Incandescent lamps were ruled out. They're too hot.

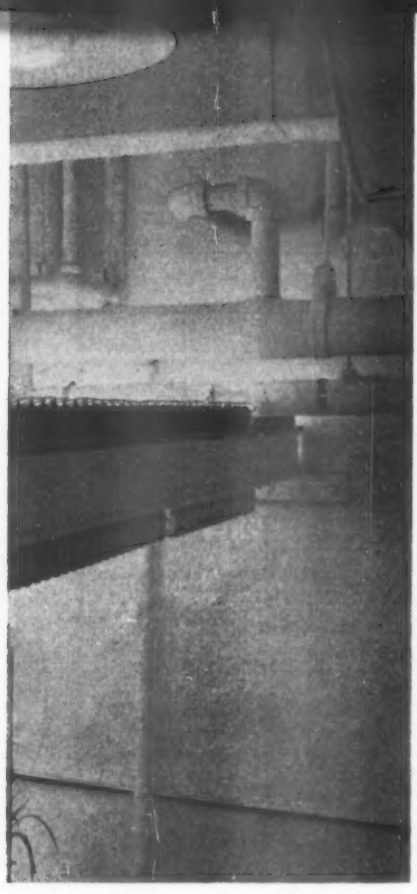
FIRST SOLUTION was regular fluorescent lamps operating at the standard frequency of 60 cycles. Eighty-eight 8-ft. tubes were mounted in the ceiling at 1-in. intervals. To avoid the heat, the ballasts, which start and operate 60-cycle fixtures, were put in a tunnel outside the room. Sounds fine, doesn't it? **Trouble was, this installation produced only 1500 foot-candles.**

FINAL SOLUTION was to hike the frequency to 360 cycles. High-frequency fixtures permitted the use of capacitors (they look like metal containers in the photo) instead of ballasts. Capacitors are cooler than ballasts, could thus be mounted directly over lamps. This did away with costly wiring, necessary when ballasts were outside the room. H-F power was supplied by two magnetic convertors. **The same lamps now produced more than 2000 foot-candles, but create no heat problem in the laboratory.**

WHAT IS H-F POWER? It's any power delivered at more than the standard U. S. frequency of 60 cycles. In most present uses it runs around 400 cycles. Why 400? Because that's the level best suited to aircraft, and the airplane makers were—and are—the high-frequency pioneers.

Is high-frequency fluorescent lighting new? Not particularly. Engineers have been experimenting with it ever since fluorescents were introduced. You see it in buses, railway cars, and airplanes, where its small size and light weight give it a big edge over 60-cycle equipment.

Now 400-cycle lighting has



By J. W. ST. ANDRE
Electrical Editor
FACTORY

reached the point where it should attract anyone who wants to cut the cost of installing and operating his plant lighting equipment.

HOW DO YOU GET H-F POWER? You can generate it (as is done in buses, etc.) or convert it from your own power system—probably the best method for most plants. There are three possible types of convertors:

1. Rotary convertor—the most commonly used.
2. Magnetic frequency convertor—has low maintenance costs because it has no rotating parts.
3. Electronic convertor — not yet designed, but could be.

7 Cost-Saving Advantages of High-Frequency Lighting

1 Lighter-weight fixtures. A 7½-lb. fixture developed by one manufacturer would weigh 47 pounds if designed for 60-cycle operation. An extreme example, perhaps. But the fact is, you'll save from 15 to 20 pounds per fixture by switching from standard to high-frequency lighting. Multiply that by, say, 10,000 fixtures, and you get 75 to 100 less tons hanging from your structure. Means less money spent on fixture supports.

What's more, there's less metal in lighter-weight equipment, so you'll also save on the fixtures' initial cost.

2 Smaller ballasts or capacitors. Ballasts for 60-cycle fixtures cost up to $15 apiece. With 400-cycle lighting, you'll use small ballasts —or capacitors—that shouldn't run you over $1 each.

A 60-cycle ballast is usually enclosed in the fixture. So when you want to change it, you have to take down the entire fixture. But the newer capacitors are made to screw into the outside of the fixture. This makes it easy to replace them, cuts a nice slice off your lighting maintenance bill.

3 Less heat from lighting. Ballasts for 60-cycle fixtures lose as much as 32 to 40 watts, which, when multiplied by several thousand lights, puts a heavy load on your air-conditioning equipment. High-frequency capacitors, on the other hand, lose little heat.

4 Better lamp output. High frequency improves lamp efficiency. How much? Depends on the lamp and the type of circuit. You may get up to 40% more light from the same fluorescent tubes. Any way you look at it, you're sure to get more for your lighting dollar.

5 Controlled lumen output. The output of 60-cycle fluorescent lighting is reduced as the lamps burn. There are two reasons for this: The tubes themselves dim; dirt accumulates on the tubes and fixtures. So you have to change the tubes periodically and wash the fixtures.

But with high frequency you simply turn a knob on the frequency convertor panel to restore the light to its original level. This kind of control shaves the expense of washing fixtures.

6 Silent operation. There's a transformer hum in most 60-cycle ballasts. This is no problem where machinery is running. But it's a disturbance in otherwise-quiet offices. Usual solution: Remove the ballasts from the fixtures and isolate them from the office area. Needless to add, this costs plenty.

You'll have no humming ballasts with high-frequency lighting. The capacitors used with 400-cycle fixtures are silent.

7 Reduced stroboscopic effect. Around revolving machinery there's a chance of annoying stroboscopic effects from 60-cycle fluorescent lighting. You can get some relief by staggering the fixtures across the three phases of the lighting circuits—an expensive job.

This problem, too, is eliminated with high-frequency lighting. At 360 to 400 cycles stroboscopic effect is reduced to the vanishing point.

Easy-to-keep records like these tell exactly...

EMPLOYEE Jones, John J.
CLOCK No. 1615 DEPT. 101

FIRST AID HISTORY RECORD

DATE REPORTED	DATE INJURED OR ILL	NATURE OF INJURY OR ILLNESS AND TREATMENT
4/5/52	4/5	Laceration right index finger
4/20	4/19	F. B. left eye - imbedded chip - rust ring - sent Dr. Johnson.
6/10	6/4	Claims injury on 6/4 - Pain and swelling left groin. Sent to Dr. Smith for examination and diagnosis - left inguinal hernia - To have surgical repair - Admitted city hospital 6/15 - Lost time 6/15 to 8/5/53.

HISTORY CARDS—from which Barber-Colman accident-record system stems—are kept by nurse in Kardex file in first aid room. Every visit, except for personal illness, is recorded. The nurse "flags" repeat injuries at once to safety office.

DAILY ACCIDENT RECORD 4/5/52

NAME	CLOCK No.	DEPT.	TIME	NATURE AND HISTORY OF INJURY	DRS. CASE	LEFT PREMISES
Jones, J.	1615	101	7 10 / 7 05	Laceration - finger	No	No
Fisher, K.	626	133	7 14 / 7 10	Wood sliver - rt. index finger	No	No
Johnson R.	1810	115	7 30 / 7 20	Temp. 100.6 Sick - sore throat sent home	No	Yes
Dean, B.	816	128	8 10 / 8 00	Using air hose to clean chips F.B. rt. eye 6/9 imbedded	Smith	10 30
Hill, O.	915	119	8 36 / 8 30	Laceration right ring finger	No	No
Ralston, J.	965	85	9 15 / 9 13	Redressing - Industrial	No	No

DAILY SUMMARY lists personal visits as well as all injuries noted on history cards. On the back is a "total this month" of injuries, dressings, eye injuries, personal visits. Because summary is daily, fast follow-up is possible.

How Much Accidents

COST OF ACCIDENTS REPORT
2nd Quarter 1952

	101	115	119	120	128	603	623	652
LOST TIME	73.80	54.40	47.73	56.26	18.62	35.84	5.88	7.84
HOSPITAL COST	22.04	11.76	15.61	17.92	4.69	13.86	2.94	8.89
MEDICAL COST	48.00	35.00	76.00	25.00	13.00	55.00	35.00	70.00
COMPENSATION	—	—	—	—	—	—	—	—
TOTAL COST	143.84	101.16	139.84	99.28	36.31	104.70	43.82	86.73
HOURS WORKED	70656	26037	71017	56838	38086	23247	30396	21432
COST/1000 MAN-HOURS	$2.04	$3.88	$1.96	$1.75	$0.95	$4.50	$1.44	$4.05

TOTAL ACCIDENT COSTS by department are obtained by adding doctor bills and compensation costs to "time costs" taken from worksheet (upper right, opposite page). Dividing by number of hours worked then gives a final figure on cost of ALL accidents per 1000 man-hours (not just lost-time accidents, as that term is usually applied to accident rates). Safety Director Hilton feels that the records needed for this cost analysis pay for themselves in better safety performance.

ACCIDENT REPORT
FOR 2nd Quarter 1952 DATE

DEPARTMENT	ALL ACCIDENTS	FIRST AID CASES	ACC. REQUIRING DOCTOR'S CARE	LOST TIME CASES	ACC. RATE PER 1000 MAN HOURS
101 - Doe	35	8	2	0	.51
115 - Smith	25	4	1	0	.96
119 - Brown	35	14	1	0	.50
120 - Carter	48	21	2	0	.88
128 - White	12	3	1	0	.32
133 - Murphy	21	5	4	1	.94

QUARTERLY SUMMARY, with foremen's names listed, shows frequency rates by departments. Copies go to supervisors, superintendents, and top management. It's made up by totaling the entries from the daily reports.

COST OF ACCIDENTS WORK SHEET
2nd Quarter 1952

DEPT. 101		DEPT. 115		DEPT. 119		DEPT. 120	
LOST TIME	HOSP. TIME	LOST TIME	HOSP. TIME	LOST TIME	HOSP. TIME	LOST TIME	HOSP. TIME
$1.03	$.28	$.50	$.21	$1.10	$1.40	$.89	$.77
"	.21	"	.21	"	.21	"	.42
"	.14	"	.28	"	.42	"	.56
"	.35	"	.35	"	.77	"	.42
"	.14	"	1.40	"	.35	"	.63

WORK SHEET is used to start accumulating actual dollars-and-cents cost of accidents. Hospital cost and lost-time cost are standard figures for time in hospital and transit. They reflect operating cost, wage rates, overhead, etc.

Cost Us

Besides getting exceptional details on cost, Barber-Colman has had a major improvement in its safety performance as a result of records and forms that force follow-up and careful analysis of accidents.

By H. K. HILTON, Director of Safety and Health
Barber-Colman Company
Rockford, Ill.

BEFORE I TELL YOU how we tackle the problem of accident control and cost analysis at Barber-Colman, let me give you a direct answer to an important question:

"Doesn't it take a lot of time to do all this paperwork?"

That's how Walter Wagner, FACTORY's Western Editor, put the question to me. My answer:

"No, it doesn't!"

TAKES ONLY A FEW HOURS A MONTH · Our nurse —whether we had the rest of the system or not— would have to keep first aid records.

It takes me, at most, 20 minutes a day to post my worksheets. And remember, at the same time I'm watching for indications of a hazard, a recurring type of accident, an accident-prone man, etc.

Monthly accident charts (not illustrated) for each department can be made up in a few hours.

It takes a day every three months—the biggest single investment of time—to develop summaries.

After five years of operating under this system, we feel that the amount of paperwork is in good balance with the number of employees (about 3000) and the type of work we do.

IS IT WORTH THE EFFORT? · Our accident frequency rate has declined steadily since 1947—from 11.1 to 4.8 accidents per million man-hours. The record of the metalworking-machinery industry as a whole has stayed about level—14.1 to 11.1 and back to 14.0.

We're convinced that those figures give us a good reason for *using* (and I don't mean just *keeping*) complete accident records.

That's an important thing to remember: No system is better than the personal follow-up it triggers. We think this personal follow-up is a built-in feature of our system.

For Hilton's blow-by-blow description of how his records are maintained and used for follow-up, turn the page.

How Barber-Colman Uses Its Accident Records

1. FIRST AID HISTORY RECORD · Every injury, however minor, is noted on this form by the nurse at the time she treats the worker.

USE · This card is the basis for the rest of our system. But, by itself, it . . .

. . . **helps us spot accident-prone workers.** If a man comes in for first aid often, or more than once or twice for the same type of injury, the nurse reports this to me. I talk with the man and his supervisor. We take remedial action at once—anything from a machine guard to a job transfer.

. . . **enables us to locate sources of minor injuries** before they become sources of major injuries. This means spotting accident-prone machines or jobs.

Sure, this puts part of the responsibility on the nurse. But we feel she's qualified. And we don't feel we'd get enough more out of a routine re-check of paperwork to justify the cost.

2. DAILY ACCIDENT REPORT · The nurse makes up this report daily from the first aid history cards. A rubber stamp on the sheet is filled in to give me a "total so far this month" of all injuries, dressings of previous injuries, eye cases, and personal treatments (colds, etc., *not* shown on the first aid cards.)

USE · This report is the basis, as you'll see, for other reports kept in my office. But it also let's me watch for too-frequent visitors to first aid, for a too-common cause of accidents, for a department running heavy on injuries, etc. Because this is a daily report, we can follow up while the accident and its cause are fresh in the minds of the worker and his supervisor.

3. SUPERVISOR'S REPORT OF ACCIDENT · This is used in every case of an injury requiring a doctor's attention, whether or not it's a lost-time injury. The injured man's supervisor fills it out and returns it to my office. We use a standard form (H-12) developed by the American Mutual Liability Insurance Company.

USE · Since this form is filled out by the supervisor on the day after the accident at the latest, he is able to make a thorough investigation of the circumstances and causes of the accident. And also to make his suggestions for preventing similar accidents as constructive as possible.

When this form is submitted to us, we usually visit the supervisor in his shop and review his recommendations. If any steps can be taken to prevent a future accident, we arrange to have the work done promptly.

4. ACCIDENT CHARTS · Working from the daily accident reports, we post a worksheet for each department. These are totaled at the end of the month. Dividing the total injury count for the department by the number of hours worked (obtained from accounting), we calculate the accident-frequency rate for the department. We also figure the plantwide rate.

USE · The frequency rate is reported in graph form, and is compared with previous months and with the last year's average. At the bottom of the graph is a "scoreboard" of doctor cases and lost-time cases—a rough index of accident severity. These graphs are posted on department bulletin boards.

The plantwide figures are graphed and posted in my office, with figures going back four years.

5. QUARTERLY ACCIDENT REPORT · By departments and foremen's names, this lists the number of accidents and the frequency rate. I make up this report from the daily worksheets.

USE · This report goes to supervisors, superintendents, and top management. It gives the supervisors a chance to compare their records with other departments. And it points out to superintendents and top management any departments that are clearly out of line.

6. COST-OF-ACCIDENT RECORD · To prepare this record, I first make up a worksheet, with two columns for each department: hospital cost and lost-time cost.

From the daily accident report we find the number of minutes each worker spent in the first aid room. This hospital cost is charged to the department in which the man works at 7¢ per minute—a rate developed for us by accounting, which includes the nurse's salary, medicine, overhead, etc. This is reviewed periodically.

Lost-time cost is a standard figure calculated quarterly for each department. It represents the cost of not having an injured worker in the department for the normal length of time he is away from his job on a trip to the first aid room. This cost varies with the distance from the department to the first aid room and with the average wage rate for the department.

USE · At the end of the quarter, these columns on the worksheet are totaled and posted to the cost-of-accidents report. Then we add all doctor bills and any compensation costs chargeable to the department. Dividing this total cost by hours worked in the department gives us a cost of accidents per 1000 man-hours. No longer do we have to guess at what either frequency or severity rates mean in terms of actual dollar costs. We know.

They'll Do It Every Time
Registered U. S. Patent Office
By Jimmy Hatlo
TODAY, CHILDREN, PROVERBS! THE FACTORY MACHINE-SHOP FOREMAN SEZ, "AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE."
CAN'T WE FIX THAT NUMBER 3 PRESS? SHE WAS DUE FOR AN OVERHAUL A MONTH AGO! ONLY TAKE ABOUT A DAY, AND THE MACHINE GANG'S NOT TOO BUSY RIGHT NOW!
NO-NO-SORRY, HUGO! LOOK AT THIS BATCH OF ORDERS! WE COULDN'T CLOSE DOWN FOR EVEN AN HOUR!
THANX AND A HATLO HAT TIP TO C.R. SALISBURY, 30 SPENCER RD., GLEN RIDGE, N.J.
BUT-TAKE THE PRODUCTION SUPERINTENDENT (AND YOU CAN TAKE HIM). HE SEZ (WE QUOTE) "ROME CAN BE BUILT IN A DAY!"
BUSTED? YEH--BUT YOU'RE A MECHANICAL GENIUS! WHY, YOU CAN GET HER RUNNING AGAIN IN HALF A DAY OR SO--CAN'T YOU, HUGO? OLD BOY, OLD PAL, OLD BOY....
WHA-AT? HALF A DAY? IT'LL BE THREE WEEKS BEFORE WE CAN GET NEW PARTS HERE--AN' I GOT THREE MACHINISTS IN THE HOSPITAL NOW....
10-20
COPR. 1952, KING FEATURES SYNDICATE, Inc., WORLD RIGHTS RESERVED.

Sure, they'll do it every time—

but not in plants that understand and apply these

Eight Fundamentals of Preventive Maintenance

By **ARTHUR D. BUSCHMANN**, Plant Engineer,
Ivanhoe Plant
Perfection Stove Company, Cleveland

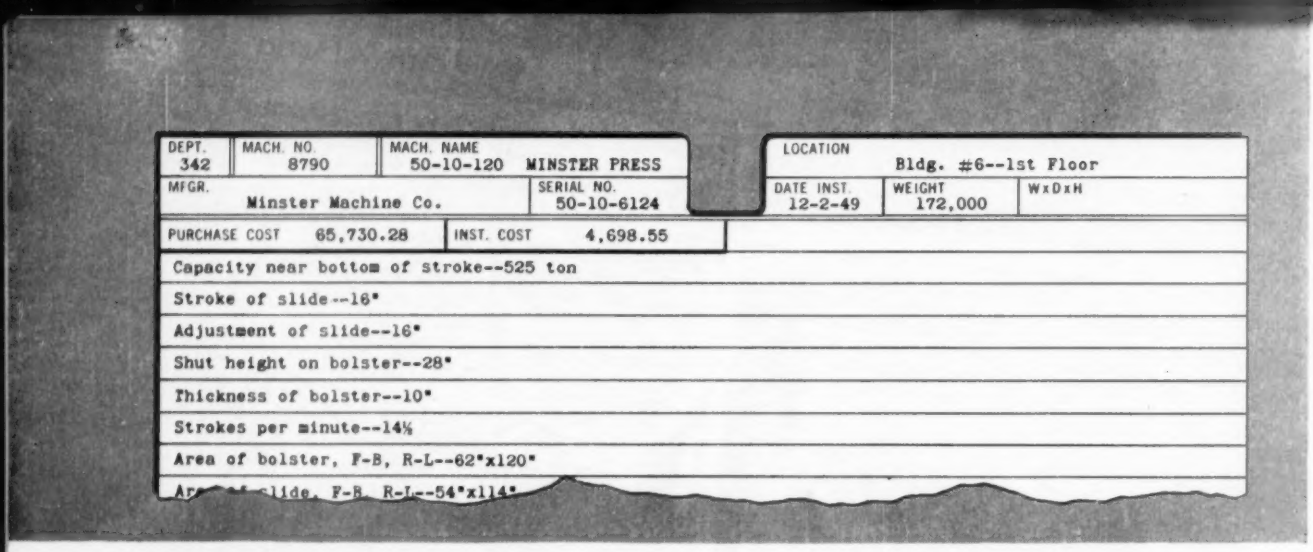
YOU CAN'T RUN a successful preventive maintenance program in your spare time. Nor should you look for results overnight. But you *can* expect returns far bigger than the costs, if you're willing to do the job right.

We started our preventive maintenance program at Perfection Stove three years ago. It took time to get under way. But we're rolling along in high gear now, with some "over-drive" economies that are really keeping down our maintenance costs.

Production costs, too. It's hard to prove you've eliminated an expense that didn't happen. But here are some positive results:

1. Unscheduled downtime practically nil.
2. No assembly stoppages due to breakdowns.
3. Longer equipment life. Cost of replacement parts is often halved.
4. Maintenance efficiency almost doubled. We've just about doubled plant and equipment in the last five years, but added only five craftsmen. Forty men are maintaining 10-million dollars' worth of plant. We do 70% of our maintenance work according to schedule.

For Mr. Buschmann's eight fundamentals of preventive maintenance, turn the page.



DEPT.	MACH. NO.	MACH. NAME		LOCATION		
342	8790	50-10-120	MINSTER PRESS	Bldg. #6--1st Floor		
MFGR.		SERIAL NO.		DATE INST.	WEIGHT	WxDxH
Minster Machine Co.		50-10-6124		12-2-49	172,000	
PURCHASE COST 65,730.28		INST. COST 4,698.55				
Capacity near bottom of stroke--525 ton						
Stroke of slide--16"						
Adjustment of slide--16"						
Shut height on bolster--28"						
Thickness of bolster--10"						
Strokes per minute--14½						
Area of bolster, F-B, R-L--62"x120"						
Area of slide, F-B, R-L--54"x114"						

EQUIPMENT RECORD CARD is one of three easy-to-keep forms that constitute all the paperwork needed to make Perfection's preventive maintenance program work. Not shown is a motor card (used, of course, only when the equipment has a motor).

Eight Fundamentals of Preventive Maintenance

Begins on page 87

1 Sell management and supervision down the line. You can usually assume everybody is for preventive maintenance when it doesn't interfere with production schedules. What you've got to do is convince production-conscious people that output is greater, schedules are firmer, forced downtime is lower, life of plant and equipment is longer, once a preventive maintenance program gets rolling. And that it can't roll unless they cooperate.

How do you do this? Best rule, I'd say, is to start the program on equipment where it promises to show substantial results within a reasonable time. Use the results to extend the program to other equipment.

We've found that management is quick to go along on any program that promises a savings. And when the promise becomes an actuality, management will push harder for a more complete program.

Here are two good "selling" techniques:

1. Periodic report. Send a report to upper management of deficiencies discovered and corrected while yet minor. Add notes that show what the same fault would have cost if undiscovered.

2. Inspection report. Send a copy of all machine inspection reports to department foremen and plant superintendent. Add notes of repairs made. This list will convince even the "die-hards" of the value of scheduled preventive maintenance.

2 Decide carefully what to include in program. We include a piece of equipment if the program saves money over casual maintenance methods.

At the moment we cover about 80% of our major equipment. Each year we add more; eventually all equipment of any consequence will be covered.

What about minor items? Some equipment items cost little to replace, but are of great importance to continued production. They must be included because of the greater cost of downtime.

On the other hand, we don't inspect about 400 non-critical fractional-hp. motors. They are checked by the oiler when he lubricates, and blown out once a year by an electrician. Outages run 5 to 10 motors a year. Most of the failures are hard-to-detect winding faults. Inspection costs would far exceed the $200 annual replacement costs.

A good program will include most of the plant's physical property. We've found it pays to inspect buildings, tanks, fences, roofs, elevators, cranes, sanitary facilities, lighting, and mobile equipment.

A good clue: If any item needs maintaining you may be able to cut costs with preventive maintenance. At the start we spent 55 man-hours a week on preventive maintenance. Now it's 185.

3 Maintain adequate records. You can't operate a good program without proper records to guide you. You need up-to-date equipment records to tell you what and when to inspect, and nature of repairs. You need accurate cost records to appraise the benefits.

At Perfection we combine all these data in one 13-tier tray-type file. Each tray holds about 75 overlapping flip-over leaves, into which are inserted a 5x8-in. equipment record (under side) and a cost record (top). See forms above.

Each piece of equipment or item is registered on a separate leaf. If a motor is involved, details are shown on a third and smaller motor record card

DATE 1935	M.F. NO.	J.O. NO.	DESCRIPTION OF WORK	REPAIR COST MATL.	LABOR	BURDEN	TOTAL
1 15	1079	--	Replace coil-product-o-meter	6 00	10 00	4 00	20 00
3 30	2736	--	Repair limit adjustment on unit	--	15 00	6 00	21 00
4 21	3262	0-3916	Install new leather on two equalizers	32 00	54 00	21 60	107 60
5 28	3481	--	Align ram with bolster plate	--	18 00	7 20	25 20

DEPT.	MACH. NO.	MACH. NAME	DATE OF NEXT INSPECTION
342	8790	50-10-120 MINSTER PRESS	JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

COST RECORD CARD (like equipment record card on opposite page) is kept for every major piece of equipment in the plant. Sliding signal at lower right shows when next inspection is scheduled. Taller signal marks date when repairs are being made.

placed under the equipment card.

The same clerk who handles all our other maintenance paperwork takes care of all the clerical details of our preventive maintenance program. Takes him about 4 hours a week, exclusive of preparation of work orders and posting repair costs These are daily routine duties.

4 Inspect on a definite schedule. Unless you guard against it, inspections and preventive maintenance work are pushed aside by other demands. Soon you're so busy bailing out the boat you can't stop to fix the leak.

The only way to control the situation is to make preventive maintenance the No. 1 maintenance job. Eventually the reduction in breakdowns will free more than enough men to keep on top of it.

Three years ago 40% of our maintenance man-hours were spent on minor jobs as against 50% at present. In the same period man-hours on major jobs has decreased 7%. This shows we are catching more repair jobs while they are still minor.

Schedule control · Once we decide on the frequency of inspection for a piece of equipment—I'll describe our principles later—we mark it off under "Date of Next Inspection" at the bottom of each equipment record. This card is fitted with a colored sliding tab that can be moved ahead to indicate the next scheduled inspection.

We always try to schedule the actual time of inspection or repairs when production units are inoperative. This may occur between job change-overs, or before work starts on the first shift, or it may have to be on Saturday. When production schedules are full—three shifts for six days a week—it's not such clear sailing. But with proper co-operation we always find a way.

The maintenance and safety departments have authority to shut a machine down if continued operation is dangerous to equipment or personnel. Obviously this is a club that should never be misused. And there are times when you would knowingly let a motor run to destruction in order to keep an important process going as long as possible.

Lubrication schedules. Our oilers have detailed instructions as to the lubrication of every piece of equipment, as well as schedule sheets, to insure 100% coverage. They must initial the schedules for each piece to show compliance.

Their schedules allow extra time for special inspections, oil analysis, and work on crews inspecting major equipment. Every new machine must be checked out by the oiler (as well as all other crafts) before it can be started up. A lubrication engineer from our oil supplier helps work up specifications to cover lubrication requirements.

Motor inspection. Motors and electrical controls on major equipment are inspected as a part of routine every two to three months.

When time permits we disassemble, clean, paint, and re-install motors. In the past three years we have had only two failures in large motors (10-hp. and up), out of 150 in service.

5 Use written checklists. We tried the memory method, but soon moved on to checklists. At the present time we have 46, covering most plant assets. They include 3 building lists, 19 machinery lists, 18 power press lists, and 6 lists for mobile trucks, cranes, elevators, metal cleaning, and lubrication.

We don't have a general building checklist. But each spring we make a thorough inspection of the premises to note maintenance requirements.

Where necessary, our checklists show wear limits, and describe special tests to check conditions. For example, we attach particular importance to solenoid, clutch, and brake inspections on presses, for safety reasons. The solenoid inspection, which is on a separate sheet, calls for a check of actual

measurements and limits of operation. These specifications came from the manufacturer.

When developing a checklist we start with the manufacturer's instructions. To these we add other points as dictated by experience.

These lists are reusable, but it doesn't pay to reuse them too often because soilage makes them hard to read. You see, *we insist checklists be used right on the job!*

At first our inspectors used an equipment card that described the machine on one side and listed check points on the other. After a few inspections they were too dirty and oily to read. So now we keep our equipment record cards in the tray file, where only the maintenance clerk need handle them. Also, there's no danger of losing them.

6 Decide carefully how often to inspect. *Over*-inspection wastes manpower — *under*-inspection defeats your program. The answer depends on the equipment—type of exposure, hours of operation, safety requirements, production needs, etc.

Frequency of inspection in our program varies from every four hours to once a year. In a few special cases we check compressors, driers, and other vital service equipment very half hour. Even here the men initial a sheet to show compliance.

We always give new equipment a complete, continuing inspection during initial operations.

Manufacturers have gladly helped us set up inspection procedures and frequencies. Our initial schedules are always weighted on the side of safety. For example, we inspect solenoids operating clutches on presses every two weeks. As we gain experience, we lengthen or shorten the frequency as needed, or add or delete check points. It usually takes about a year to stabilize the inspection procedure on a major equipment item.

7 Choose qualified inspectors. Our policy is based on the conviction that it pays to repair as you inspect. There is an opposing school of thought that says an inspector can do a better job if inspection is his only job.

We let the inspector do most of the repair work he finds necessary. If he has to put a wrench on a nut to see if it's loose, he may as well tighten it up. Only about 5% of the troubles found by our inspectors require repairs at another time.

To do a good job, the ideal inspector often must cover mechanical, electrical, and hydraulic functions. Few men have this knowledge as applied to a variety of equipment. And to train someone in a plant of our size would be difficult and expensive.

So we have separated the inspection procedures on the checklists to cover each type of work according to craft. And we assign a mixed crew of craftsmen to handle the inspection. It's usual for one or more millwrights, electricians, and pipefitters to work on one piece of equipment at the same time. This cuts down the inspection downtime over the "one-inspector" method.

Of equal importance is our policy of shifting inspection crews from job to job, and within themselves. This rotation keeps the viewpoint fresh, and lets the men check each other.

Because we have several trained inspectors in each craft, they're always available when it's time to check a machine that's free. If we get behind, we can make up four or five crews and clean up the job on a day when production is down.

There is an exception to this broad base. We allow only one man to inspect solenoids on presses. We don't want divided responsibility on this job, involving so much employee safety.

8 Adopt administrative procedures that follow through. About a week before the scheduled date (as shown by the colored tab on the equipment card) the clerk pulls the proper checklist from a file folder. This folder contains one or more previous reports and new blank reports.

The clerk gives the checklist to the maintenance foreman, who arranges with the production foreman for an exact time of inspection.

With a week's leeway, we can usually get inspections scheduled on time, especially after production supervisors become convinced time spent on inspection saves time in the long run.

During the inspection, the inspector checkmarks all items on his checklist found to be OK. He comments briefly on any defects he finds, such as "loose, bent, broken." If he corrects them, he adds a checkmark. Thus the report reveals everything that was wrong. All his time is charged to a standing order for inspection of equipment.

The checklist now goes back to the clerk. If there were any defects, he routes it to the maintenance foreman. He prepares work orders for repairs not completed by the inspector. In this the foreman and craft group leader give him specifications.

Completed checklists are compared with previous reports. If a report shows repetitions of the same faults, or significant notations, it goes to the maintenance foreman for action before filing.

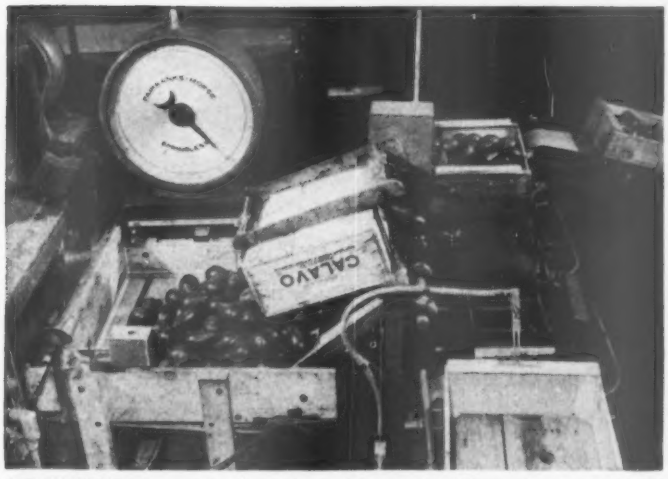
Final step is to move the scheduling marker to the next inspection date. But whenever an inspection requires a work order, a second taller marker is moved to the current inspection date to show there is repair work outstanding. It remains there until the correction has been made.

Defects that are repeaters may show up in inspection reports or on the repair cost record. We continually analyze these sources for that purpose.

Our records once showed repeated failures on one type of machine. They were traced to improper operation. Improved instruction and set-up, plus a safety interlock designed by the maintenance department, eliminated a $1600 yearly expense. This shows how follow-through in preventive maintenance can add big returns to the program.

ELECTRONIC SCALE:

Makes Packing Line Really Automatic



NET WEIGHT of avocados dumped on electronic totalizing scale at rate of 600 boxes per hour is . . .

. . . **RECORDED AUTOMATICALLY** on tally sheet. Packing line used to take five operators. Now one's plenty.

MISSING LINK in an otherwise automatic packing line at Calavo Growers of California, Los Angeles, has been found. It's an electronic totalizing scale that records net weight—and requires only one operator where five were needed before. It also eliminates wrong estimates of box tare.

HOW IT WORKS · Just about all the operator has to do is insert a tally sheet in a printer and punch a button at the end of each lot. That gives a printed record of total net weight of the lot, number of the lot, and number of boxes in the lot. When that's done, the printer clears itself for the next run.

All this is made possible by the ETS-7 electronic weight totalizer. The scale takes readings on the fruit dumped on the scale, converts them into numerical form, feeds the results at high speed into a business machine.

Weight accuracy is $\pm 0.1\%$ of full scale. If there's a mistake anywhere along the line, the machine sounds an alarm, won't go on.

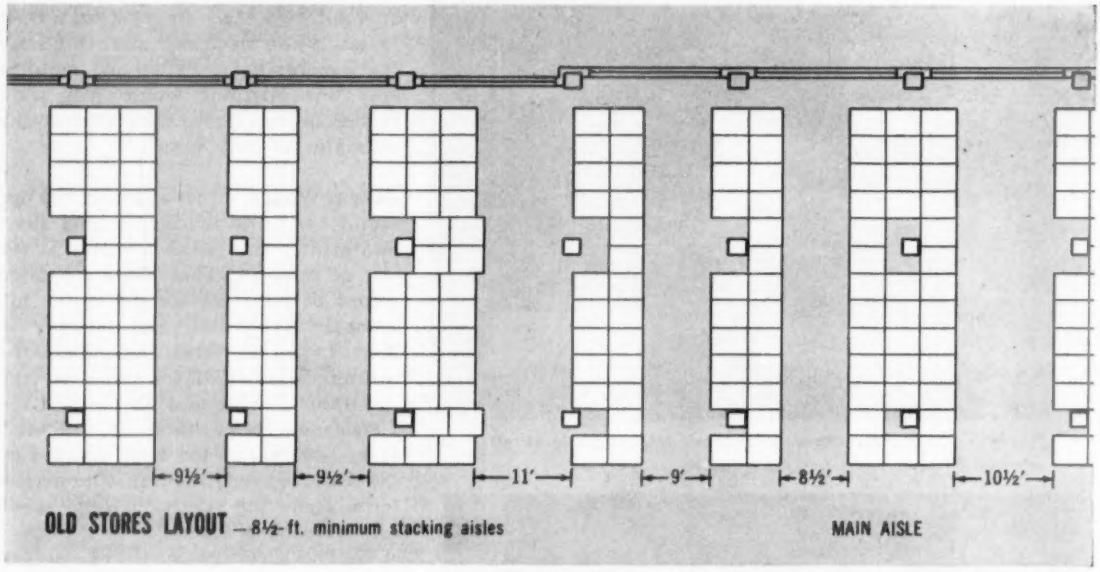
COST · An average installation, says Industrial Electronic Engineers, North Hollywood, Calif., the maker, will run about $4200. That covers adapting your scale, plus the cost of ETS-7 and printer.

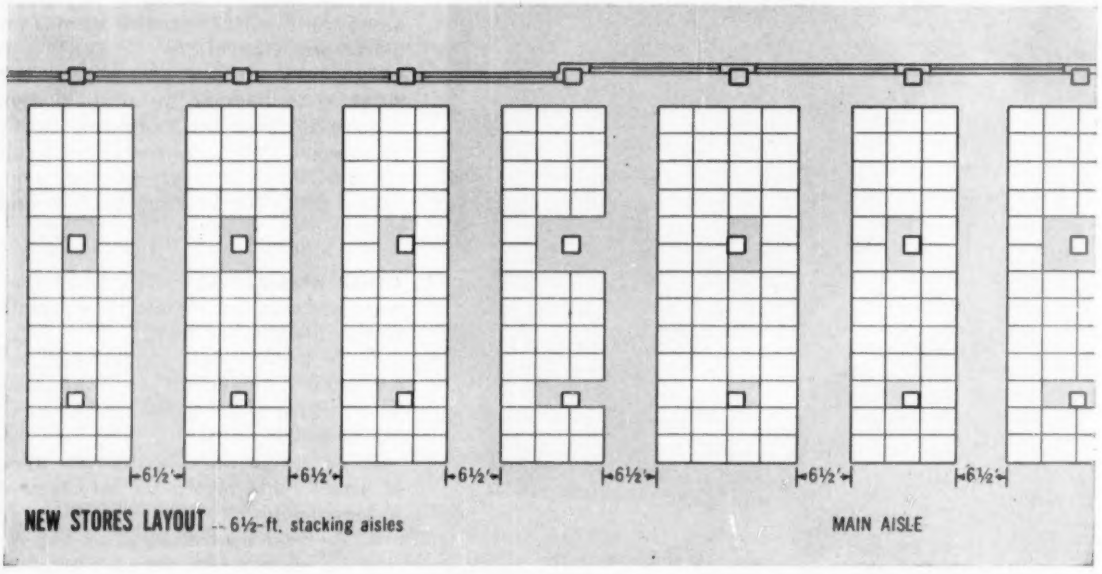
OTHER APPLICATIONS · A few other ways you can use the electronic totalizing scale in your plant:

1. To print actual weight—not accumulated weight—of each material as it's added to the hopper in any mixing operation.
2. To weigh and classify any type of product and record the information automatically.
3. To make up freight bills.
4. To give a continuous record of what comes in and what goes out at each stage of a process.
5. To feed information from one scale to a number of business machines or to feed data from a number of scales to one business machine.

To Get 25% More Storage Space...

...THEY CUT AISLE WIDTH...





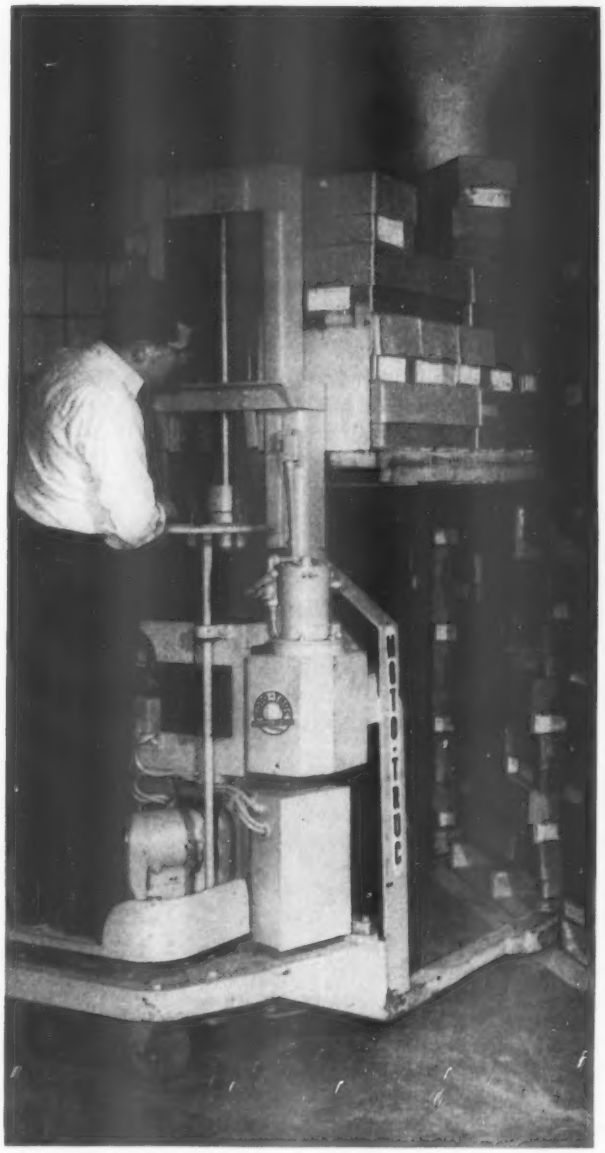
OLD STORES LAYOUT (top) at American Greetings Corporation called for aisles 8½ to 11 feet wide—to accommodate counterbalanced fork trucks—and for 2- and 3-deep stacking.

NEW STORES LAYOUT is based on 6½-ft. aisles in which two new non-counterbalanced fork trucks can maneuver—and for 3-deep (sometimes 4-deep) stacking.

. . .THEY STACK DEEPER

HERE'S HOW:

By HENRY I. BERNBAUM • Supervisor of Industrial Engineers
American Greetings Corporation, Cleveland



STRADDLER TRUCK—one of two new ones—is key to success of "compressed storage" plan. It maneuvers comfortably in 6½-ft. aisles. Sprinklers limit tiering height to 11 feet.

SUPPOSE YOU FOUND you could store 25% more pallet loads in the same floor space you're using now. Wouldn't you be surprised?

Sure. And so were we at American Greetings when we found the easy way to get some much-needed space for in-process inventory. All we had to do was utilize our "aisle rights," same as we had learned to use our "air rights" long ago.

Not only did we "compress" our space needs in our existing buildings, but we saved ourselves the cost of buying, leasing, or building 5500 square feet of new storage space. Our two-point solution:

1. CUT AISLE WIDTH • We bought two non-counterbalanced straddler fork trucks that would work efficiently in 6½-ft. aisles. Our old layout called for 8½-ft. to 11-ft. aisles to accommodate the electric counterbalanced fork trucks we had been using. Credit these new trucks, therefore, with most of the saving.

2. STACK DEEPER • Our studies showed that a change from 2- and 3-deep to 3- and 4-deep stacking would save us lots more space. And without need for more equipment or manpower to get at "buried" stock. That's because material in the inside tiers is lower turnover material.

RESULTS • Increased space utilization more than gave us the additional in-process storage space we needed. Now we can store in 21,880 square feet what we previously stored in 27,400 square feet. Space on three floors was compressed to space on two floors. And there was a resulting elimination of non-payload movements of trucks between floors.

COST • We figure our new trucks will pay for themselves in two years. That includes first cost, depreciation, maintenance, interest, and other costs. The estimate is based on the fair price of $1 a square foot per year we'd have to pay for equivalent leased space—*if* we could find what we wanted.

ADDITIONAL BENEFITS • Here are two profitable extras we got from our new set-up:

- **Greater load capacity.** Paper stocks are heavy. And the straddler gave us a certified load capacity of 3000 pounds, compared with the other trucks' 1600 pounds for the same load length.
- **Smaller equipment investment.** In fact, we were able to cut our outlay almost in half.

IDEAS OF THE MONTH *for*

LEWIS K. URQUHART • Managing Editor, FACTORY

INSPECTROSCOPE is a lot like the gastroscope the doctor uses to examine your stomach. Just a thin tube full of precision lenses that reflect the image back and forth to the inspector's eye. A strong light illuminates the area looked at. For inspecting die cavities and such. Oh, yes, there's a control wheel that curves the tube so you can see around corners. Eder Instrument Co., 2293 Clybourne Ave., Chicago.

YOU CAN RENT office furniture. A plan has been announced by the Globe-Wernicke Co., Cincinnati 12, whereby you can lease desks, chairs, etc., for a minimum of 3 years. For this you agree to pay a diminishing yearly rental in quarterly or monthly installments. Rentals may be charged off as operating expense, since no capital investment has been made.

THEY'RE BATHING dimple dies clean at Temco Aircraft Corp., Dallas—and making an easy 10-min. job of it. Here's the recipe: Mix caustic soda and water at a cup-to-a-gallon ratio. Heat to 200 F. in a glass or steel container. Drop dirty dies in. Take 'em out 2 to 10 minutes later. Rinse in plain water. Dry with a rag. They look, and work, says Temco, as good as new. (Caustic soda is not so good for hands, so better use an iron or steel basket to dip the dies in and out of the solution.)

SEEMS YOU CAN NOW BUY A HACKSAW for $4.25 that will cut practically anywhere without the frame getting in the way. Alpha Tool & Supply Co., Closter, N.J., is the manufacturer. It consists of a spring-loaded plunger with a pistol-grip handle that supports a conventional 10-in. or 12-in. blade. Pressure is needed on forward stroke only; spring makes return automatic.

SEEING-EYE SCREWDRIVER has been developed by IBM to speed final assembly adjustments on its electric typewriter. There are 42 adjustment screws on the underside of the typewriter to control the type bar impressions of the 42 operating keys. The screwdriver can be moved from one screw to the next without lifting the typewriter from its normal position in the assembly line. At the same time it finds the screw slot automatically. The bit is turned by a flexible extension shaft.

AND THERE'S A NEW HAND FILE with a cutting surface that feeds from a roll containing 6 feet of coated abrasive cloth. When the surface becomes dull, the operator pulls out a fresh one. Refills are available in a wide range of abrasive grits. Files come in 1-in. width at $2.95; 1½-in. width at $3.75. Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul; or Monarch Machine Shop, Inc., Madison, Wisc.

PARADICHLOROBENZENE — ordinary mothballs to you — is being used by Motorola, Inc., Chicago, to keep silver-plated components free from tarnish and fungus during pre-assembly storage. (Lacquer interferes with soldering. Can't be used as a protective coating till after soldering is done.)

Factory Executives

KEEPING SAFETY EQUIPMENT SAFE from dust and dirt is what E. D. Bullard Co., San Francisco, expects to do with the new transparent polyethylene bags it's using to package hats, caps, helmets, belts, etc. No matter how long these items sit on factory shelves, they're as clean as new when issued. Bags by Mehl Mfg. Co., Cincinnati.

WALLPAPER MURALS designed expressly for executive offices can now be had from James Seeman Studios, 501 Madison Ave., New York. Golfing scenes based on California's famed Pebble Beach course are guaranteed to remind any executive of that trip he must make to the West Coast.

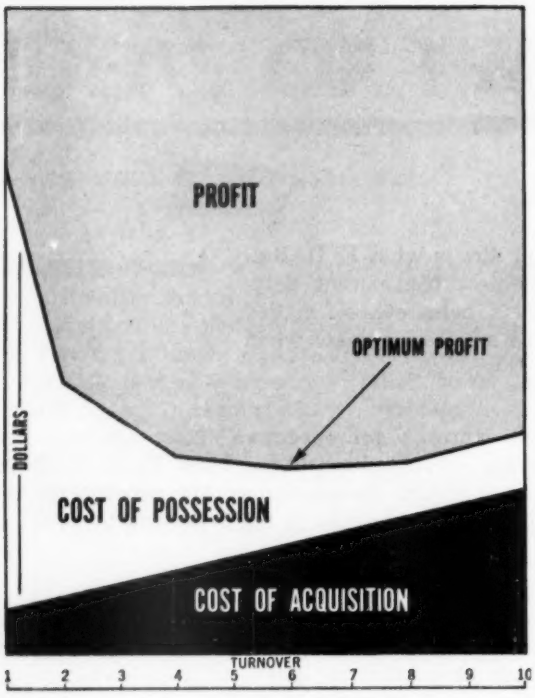
SHELTER SIGNS announced by Halco Co., 165 Dwight St., New Haven, solve your air raid shelter directional problems. Signs come in two parts. One, 20x5 inches, carries the word "shelter" in 4-in. yellow block letters on black background. The second part carries an arrow that can be pointed up, down, left, right. To apply to any smooth surface, all you do is peel off paper backings, place sign on surface, press on securely.

SPEAKING OF SIGNS, we like the black and yellow tags S. A. Hirsh Mfg. Co. is using. They read, "This order was shipped within 24 hours of the time it was received." Reminds customers that delays aren't Hirsh's fault. (These tags, too, are the paper-backed kind for easy application.)

WITH AUTOMATIC INSECT CONTROL perfected by West Disinfecting Co., Long Island City, N. Y., one man can spread an insect-killing fog through all plant areas simultaneously. Atomizer units break the insecticide into 8-micron droplets, spraying them out as a fine dry mist that remains suspended in the air and penetrates into every opening and crevice.

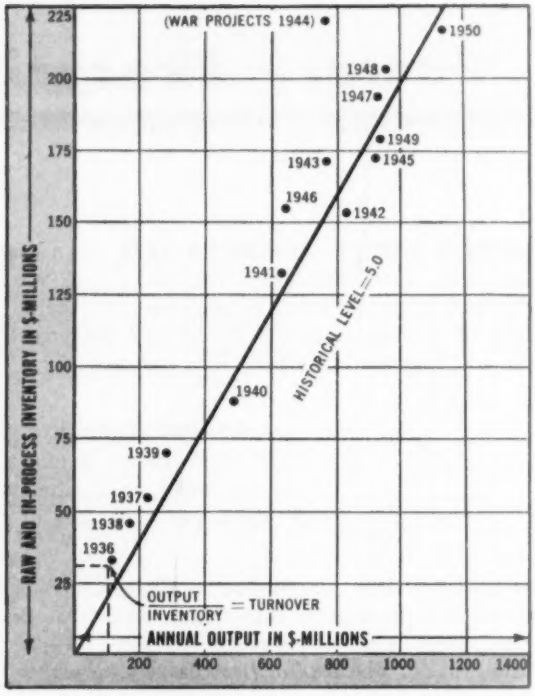
NO RASSLING with long electric cords if portable power equipment is equipped with Port-O-Reel (Industrial Electrical Works, 1503 Chicago St., Omaha 2). Good for vacuum cleaners, floor sanders, grinders, lawn mowers, etc. Reel is equipped with bracket for mounting to frame, chassis, or handle of equipment. Dust-tight collector ring permits continuous flow of current as reel is turned. Free-turning knob provides for easy winding. There's an adjustable brake and lock.

AIRCOMB is a lightweight, high-strength, sandwich-core structural material originally developed for aircraft use, now being marketed commercially by Douglas Aircraft Co., Inc., Santa Monica, Calif. It's a honeycomb structure of Kraft paper impregnated with a phenolic resin that can be sandwiched between thin facings of stainless steel, magnesium, wood, plastics, etc. A panel faced with 0.16 aluminum, Douglas says, weighs only one-sixteenth as much as a steel panel with equivalent rigidity, one-tenth as much as an aluminum panel, one-fifth as much as birch plywood.



RIGHT INVENTORY BUDGET . . .

1. IDEAL TURNOVER RATE for the company in this charted example is six—meaning the value of annual output should be six times the average inventory value of raw and in-process materials to produce optimum profit.



. . . MAY BE DETERMINED

2. HISTORICAL METHOD sets the budget at the average for years gone by. The method is simple, quickly gives you a yardstick to compare present and future with the past. In the example, the past hung pretty close to a turnover rate of 5.

Six Steps to Better Inventory

All signs point to a squeeze on profits. At least that's what a lot of economists are saying.

Suppose they're right. It's only good management to cut inventories and maintain a satisfactory return on your investment.

And if they're wrong? Better management of inventories will open up the profit margin just that much wider.

So what better time for a review of current inventory practice—in six easy steps?

By H. F. DICKIE • Manager, Production Control
Manufacturing Services Division
General Electric Company, Schenectady, N. Y.

1. Recognizing the need for control

Maintaining the correct amount of inventory is not a natural tendency. It requires conscientious, enlightened inventory management.

To the shop, inventory seems right when there are no shortages. The controller disagrees. He has to set up inventory reserves for potential obsolescence and deterioration. Also, he's concerned when prices start dropping, or when rising inventories require more cash.

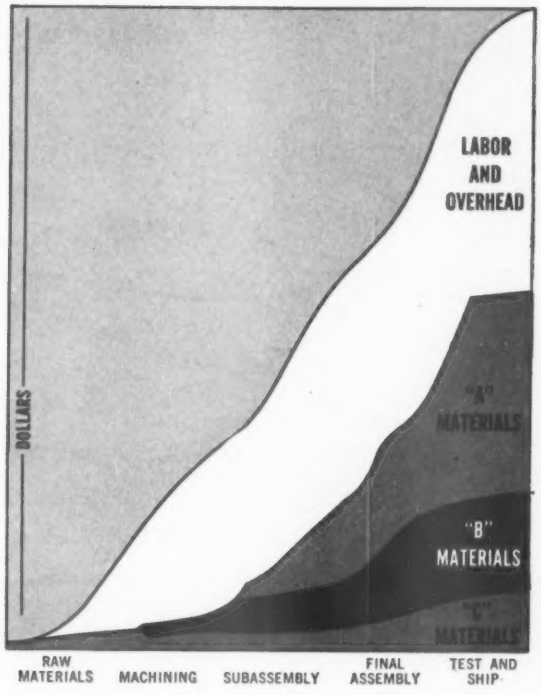
The four key questions are:

1. Is our inventory control really effective?

2. Are turnover budgets calculated—or simply guessed at?

3. How penetrating is our analysis of most-economical order quantities?

4. How many people in our organization really understand inventory-control thinking?



IN EITHER OF TWO WAYS

3. THEORETICAL METHOD is more complex, but necessary when past was erratic; when products change; or when the inventory situation needs overhauling. To calculate, plot inventory and output build-up against time, then find the ratio.

Management

One thing is common to every business: We must make a return on the investment entrusted to us.

All of us have turnover—the ratio of sales to investment. More significant than turnover—much more significant than gross sales—is the return on those sales. The percentage return on sales multiplied by the annual turnover is the index of our success as business managers—it is the percentage return on the investment we must control.

Simply, the objective of business is a good per cent of return, which is *dollars of profit* divided by *dollars of investment*. A large part of that investment is in inventories. And, in practically every business, inventory is the element most responsive to control. **Controlling inventory controls the dollars, hence per cent of return.**

However, controlling inventory is not simple. Inventory is seriously affected by purchases, but these purchases cannot be based directly on sales and stocks if you experience periods of change.

To illustrate the accentuated rise and fall of purchases with only a mild fluctuation in sales: Assume the company has established—and is attempting to maintain—the optimum turnover by carrying stock that is four times monthly sales. Now, if sales are normally 100 units per month, then the optimum stock is 400 units. The month that sales drop 10% to 90 units, total stock should be decreased 10% to 360. Purchases should cover 90 units for replacement of sales, less 40 units for the decrease in stock, or a net total of 50 units. So purchases would decrease 50% at a time when sales drop only 10%.

During periods of sales fluctuation we generally cannot reflect sales directly in our inventory-controlled purchasing, but we must take note of those sales fluctuations clearly and promptly.

2. Determining optimum turnover

The unit of inventory budget measurement is inventory turnover—annual output divided by average inventory.

Some fundamental research is required to determine the optimum turnover for your particular business, possibly even for elements of the business. It may be advisable to determine optimum turnover for the elements of inventory—raw material, work-in-process, and finished parts. You need to agree on a turnover rate that is most favorable for your business.

Figure 1 shows an actual analysis in which a turnover of six times is the company's objective. It is a calculated balance between cost of acquisition and cost of possession. Too commonly we assume that the higher our turnover the better job we are doing. If *this* company exceeds a turnover of six, it will reduce profit.

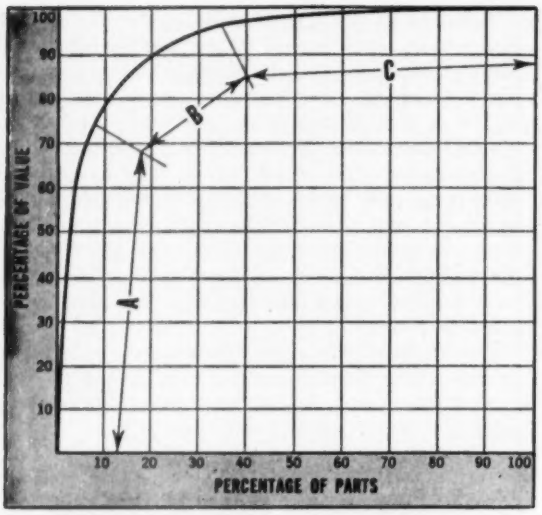
With the optimum or objective turnover clearly determined and understood by all concerned, all operating units should establish an inventory turnover budget. There are two successful methods: historical and theoretical.

HISTORICAL METHOD · This is shown in Figure 2, and is simple and sound. Dollars are plotted against average inventory for each year. Their ratio, or the slope of a medium line, gives an average historical turnover. In this illustration the turnover ratio, 5, appears to be a firm basis for a budget.

THEORETICAL METHOD · When products change, when past performance has been poor or erratic, when you need a good, thorough analysis of your whole inventory situation, then a theoretical inventory turnover calculation is better.

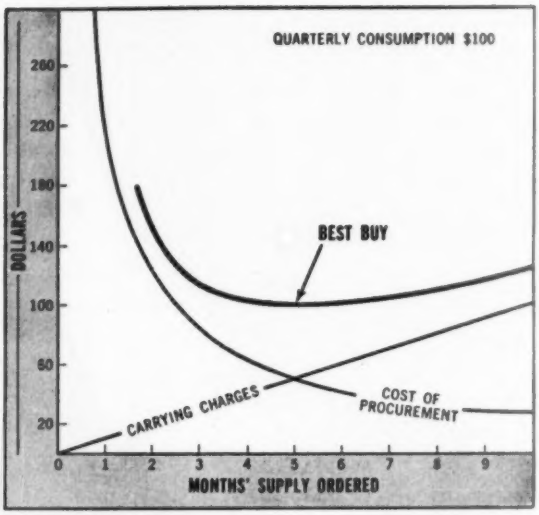
You build up each of the major classes of material, labor, and overhead costs graphically (see Figure 3) from the arrival of the first piece of raw material until product shipment.

Statistically or mathematically you lay out your



ANALYZE INVENTORY PROBLEM . . .

4. ABC ANALYSIS shows up the inventory spots where concentrated control will do the most good. *A* items are the few parts that cost most, need closest control. *C* items are the many parts that cost little. *B* items are in between.



. . . TO ORDER RIGHT AMOUNT . . .

5. OPTIMUM QUANTITY to order at one time is indicated by lowest sum of procurement and carrying costs. For practical use, construct a family of "best buy" curves on one chart, each curve representing a selected quarterly consumption value

material and labor cycles by units of time, and calculate your turnover. Then you may have to project this theoretical calculation to an actual basis, making an allowance for actual conditions in your operation—in other words, be practical.

3. Analyzing your inventory problem

To meet a good budget objective, we must analyze the inventory problem.

One very effective tool is "ABC analysis," (FACTORY, July 1951, p. 92) which is simply General Electric's term for the proportional-parts evaluation of inventory. It breaks down inventory items into three classes:

- **"A" items are those few major ones** that tie up most of the inventory investment.
- **"B" items are those of secondary importance.**
- **"C" items are the numerous but inexpensive ones** that make up but a minor part of the inventory investment.

Figure 4 is an actual, typical ABC inventory curve showing that 75% of the cost in this particular case is made up of *A* items, comprising in number only 8% of all items.

The middle 25% are called *B* items and are equal to 20% of cost.

The *C* items amount to 67% of the total items, but only 5% of the total cost.

HOW ABC PLAN WORKS · *A* items are ordered, scheduled, and rescheduled for receipt on weekly, daily, or even hourly basis. Their movement through the shop is analyzed in detail, seeking continuous flow. The standby stock on *A* items must be held to an absolute minimum.

On the other extreme, the numerous but inexpensive *C* items must be handled economically, even frugally, because they probably add up to 75% of the number of items or records handled by the buyers, order clerks, record clerks, stockkeepers, inspectors, etc. Since a large and safe protective stock can be carried quite economically, detailed analysis of order quantities and schedules can be dropped.

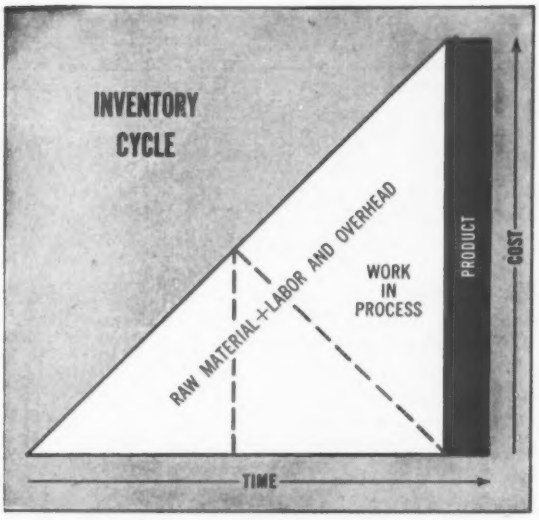
You might first set up an abundant buffer stock quantity, then order six months' or a year's supply. Seal up an adequate amount for an order-point quantity, and attach an identifying re-order tag. Keep no receipt-withdrawal-balance records of the item. When the stockkeeper must break the seal on the order-quantity package he sends the attached tag to the office.

4. Ordering the right quantity

Of the many inventory controls, economical ordering is not only an initial but also a critical step. Turnover, our prime objective, is closely correlated with effective ordering.

Select order quantities accurately. The major influencing factors are:

1. How much it costs to carry a dollar's worth of inventory for a year.



...AND MINIMIZE WORK IN PROCESS

6. INVENTORY CYCLE is the time from receipt of the first raw material to shipment of product. The diagram shows why a relatively small time cut near the end of the cycle is just as important as a big cut at the beginning.

2. Cost of procurement.

3. Cost of the item being ordered and quantity price discounts.

4. Potential obsolescence and deterioration.

Carrying cost must take into consideration: taxes, insurance, obsolescence, interest on money invested, deterioration handling, heat, light and rent.

Generally the carrying cost in a manufacturing industry will exceed 2% per month.

The important cost of procurement is not the cost of placing one order, but rather the difference in cost between obtaining a given amount in one order or in two orders. It includes costs of ordering, purchasing, inspection, laboratory certification analysis, receiving, stock handling, recording, invoice payment, difference in transportation cost, etc. One company was surprised to find its cost of procurement was $21.11 per order.

It is unlikely that you will order wisely unless you know these factors. If you do, then you can balance "cost of procurement" (which encourages infinitely large orders) against "carrying costs" (which suggest infinitely small orders). Depending on the cost of the item and its usage rate, you can readily determine the best buy.

Figure 5 shows the graphic calculation of an order quantity for an item of which the quarterly usage is only $100. It suggests that a 5-month supply be ordered. Now this is only true where the carrying charge is 5% per month, and cost of acquisition is $20. The factor of quantity price discount is not yet considered.

Similarly, if the quarterly consumption is $2500, the economic order quantity is less than one month's supply.

A set of curves (Figure 6) may now be plotted for a variety of usages, under a calculated set of conditions, to indicate the best order quantity for a wide range of consumption rates.

This calculation recommends only the number of months' supply to be ordered. Next, price discounts for larger quantities must be evaluated for each order to see if the savings obtained by purchasing a larger quantity are greater than the carrying costs—for example, if calculation recommended that you order a 3-month supply, but you could get a better price by buying a 4-month stock. In one particular industry you would have to save 2% per month if it were a raw material, and 5% per month if it were a finished part to justify buying the additional month's supply.

We cannot leave the subject without giving recognition to the other factors that must be considered in determining an order point. These include estimated usage, procurement time, protective stock, minimum order quantity, the effect of stock depletion, and similar factors. It may well be the responsibility of the purchasing department to see that current recommendations on the last three are furnished to the ordering sections.

5. Minimizing work in process

Let us shift attention from the control of raw material inventory to the important work-in-process inventory. In several major heavy apparatus lines at General Electric, the average work-in-process inventory is 58% of total inventory. Nationally, the average in-process inventory, even for the mass production or continuous industries that have a high percentage of inventory in finished stock, is about 20% of total inventory.

The relative importance of controlling work-in-process inventory is well illustrated if we consider the graphic build-up of inventory for a theoretical product, as shown in Figure 6.

If the manufacturing cycle is ten weeks and we bring the raw material in one week later than shown, we save the area under the curve on the left side of the diagram for one tenth of the horizontal distance, a relatively small amount.

If we can reduce the final assembly, testing, boxing, and shipping time by a corresponding week, we save the area under the right side of the figure for one tenth of the horizontal distance. This is obviously a far greater economy.

From an inventory controller's point of view:

$$\textit{Mfg. cycle efficiency} = \frac{\textit{Processing time}}{\textit{Total elapsed time}}$$

One company found it took 280 hours to produce a device that required 10.5 hours of actual processing time—a manufacturing effiiciency of 4%!

It is helpful to focus the attention of manu-

facturing planners and production control schedulers on the manufacturing cycle efficiency by mechanically plotting manufacturing cycle charts so that they show both actual machining and processing time as well as non-productive time.

A ITEMS REVIEWED • Obviously the *A* items are the ones whose processing time we wish to review. In our multiple-story buildings we prepare oblique sketches to show the flow of materials and parts. Flow-analysis diagrams permit clear analysis for possible replanning of operations or rearrangements of equipment.

Another useful device is the process-analysis flow chart. This standard operation analysis sheet focuses attention on needless moves, unnecessary storage, and possible combinations or elimination of operations and inspections.

Incidentally, these manufacturing cycle reduction studies often raise the interesting problem of the reduction of manufacturing cycle and inventory that is possible by going to multiple-shift operation as counterbalanced by the disadvantages of night workers' bonus, additional expenses, losses, etc.

BEST STOCKROOM • Most of our efforts towards mechanization of materials handling, shorter and continuous flow of production, the cybernetic trend, are good inventory control mediums. One department is considering a radical rearrangement based on the idea that "the best stockroom is no stockroom at all."

Often high work-in-process inventory is *not* due to poor layout or original planning, but rather to poor execution of schedules, lack of materials, and poor coordination.

JOB-SHOP FLOW • The first fundamental of good job-shop flow requires that the production schedulers have as a guide a unit, labor, machine, or master scheduling system that is as accurate as is practically possible. It is a complex job to get satisfactory balance in a job shop manufacturing continually varying products. Therefore, it takes much thought and development to set up a practical but satisfactory master scheduling system. Then even the best system must be intelligently operated and controlled by a capable, experienced production planner. He should have:

1. Adequate assistance and authority to expedite late materials, tools, drawings, etc., necessary to meet schedules.

2. Direction of the move men, trucks, and cranes required for prompt material movement.

3. Full authority to dispatch jobs to the workmen, combine or split set-ups as schedules and flow require, with an objective of preventing work being done ahead of schedule to keep operators busy.

4. Responsibility for advising the responsible production project man whenever a delay occurs that is beyond the dispatcher's control.

6. Educating everyone involved

When a material supply is exhausted, output is cut. So it is natural that the buffer stock tends to be increased more and more. Purchasing normally favors larger order quantities. Human procrastination postpones the disposition of surplus and obsolete inventory. The inventory control supervisor must try to counteract this undesirable trend.

G-E PROGRAM • Several years ago, General Electric undertook a major inventory reduction program.

Each department worked feverishly. Each used the best methods of inventory control and reductions it knew. Plans ranged from courses in inventory control to "starvation" incoming material allotments; from elaborate reviews of quantities purchased to rigid material disposition programs and stringent controls of labor.

SELLING THE IDEA • As the program progressed, we analyzed and compared the effectiveness of the many approaches employed. **It became apparent that the most successful was a large plant that emphasized a broad, thorough inventory control selling and educating program.**

Subsequently, we have tried to help our inventory supervisors make their educational and selling efforts more effective. We have suggested that they try to find the best way to interest the group they are currently seeking to make more inventory-conscious. We have urged that they even use emotional appeals in their inventory selling efforts.

Inventory supervisors have been urged to seek advice from advertising and sales promotion experts in preparing their training material.

They have recognized and utilized the appeal of contests, with publicized progress reports and department-wide recognition for the supervisor with the best inventory turnover performance.

MANUALS • Inventory management manuals and books are written to give a large number of the employees a complete and clear idea of the inventory function, its importance and its mechanics. These manuals have proved to be quite effective and of continuing value as reference books.

Area or divisional meetings of inventory supervisors are stimulating for the supervisors.

We have personalized the importance of each foreman's part in inventory control by allocating amounts of inventory to each foreman.

To reach the important ladies in clerical groups we traced a hypothetical French chapeaux business through an inventory cycle from creation, or purchasing, to control of work-in-process, to disposition of surplus and obsolete materials.

In short, we are convinced that inventory is best controlled by adequately informing and educating everybody who has a hand in it.

NEW MULTIPLE-SPINDLE DRILL saves many hours of machine operator time by producing in four operations the 38 holes in an Argus C-4 camera case. It replaces . . .

. . . OLD METHOD OF DRILLING HOLES, which called for 38 operations on this row of 14 drill presses. Arrows point to push-buttons, concentrated in new method, scattered in old.

Better Methods Cut Retail Price 10%

It's not often that methods engineers can see their efforts reflected directly in lower selling prices. Here's a case where they did.

LIST PRICE on an Argus C-4 camera used to be $99.50. Last month it dropped to $89.50.

Credit this 10% drop, says the manufacturer (Argus Camera, Inc., Ann Arbor, Mich.) to a hatful of improvements in production methods.

Add these improvements all together and you have simpler assembly methods, fewer rejects, improved quality, less chance of faulty parts getting to the assembly line. Selected samples include . . .

. . . MULTIPLE SPINDLE DRILLING • The photo above shows a new machine that drills 38 holes in each C-4 case—*in four simple operations.* Eccentric plates make it possible to drill holes closer together than ever before.

The old method is depicted in the other photograph (right). It shows everything but the tired look on the operator's face. No wonder he was tired! You'd be, too, if you had to traipse up and down a row of 14 drill presses all day long. He had to drill his 38 holes one at a time.

. . . AUTOMATIC PRESS • Shutter leaves were formerly stamped out on three machines with five-station progressive dies. Machines had to be stopped every time they used up 8 feet of stock.

The new way employs a new press that doubles the output of all three old machines. It has a stock straightener, so can use coiled stock. Saves those frequent stops to load more stock. Saves material, too. An automatic oiler has replaced hand swabbing to lubricate the stock as it enters the press. Feed through the die stations is mechanical and automatic. One operator can tend two of these new presses.

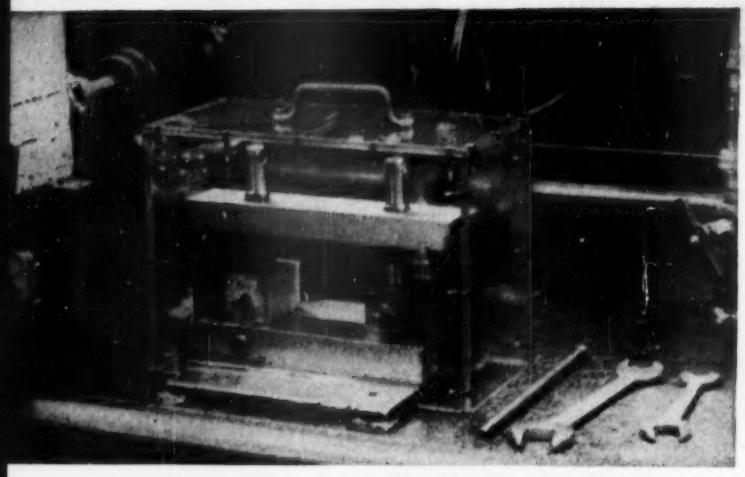
. . . INDUCTION HEATING • Each C-4 camera has three lens elements. Each element has to be ground and polished. That's six operations per camera.

To fix the lenses for work, they are mounted on pitch-covered metal fixtures. The pitch must be heated to melting temperature each time a lens is affixed to or removed from the fixtures.

The old way was to heat the pitch on a hot plate until, in the operator's judgment, the temperature was right.

In the new method, induction heating brings the pitch to *exactly* the right temperature in a split second. It's easy to visualize the resultant saving in labor costs.

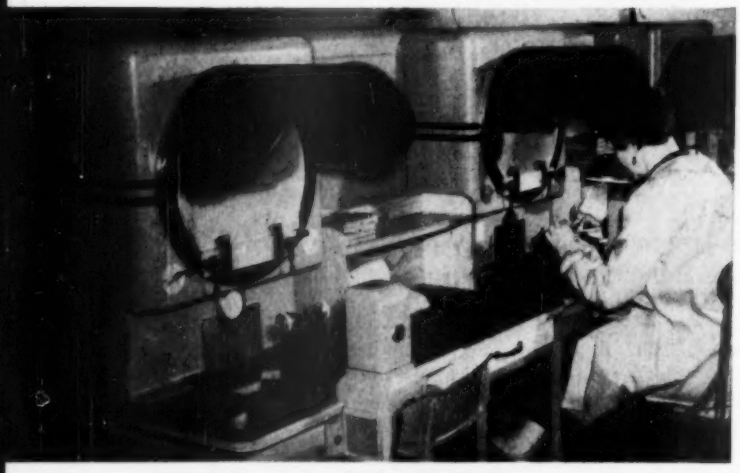
OPERATING SHORTS



How to See Tests Under Cover

This clear plastic box protects an inspector from oil splashes while he observes a hydraulic test at Lewis-Shepard Products, Inc., Watertown, Mass.

The inspector puts a hydraulic valve unit in the test fixture, then opens a valve to subject the unit to hydraulic pressure. If the unit's all right, the protecting box isn't necessary. But if the unit leaks under pressure, oil splatters the inside of the box, not the inspector.

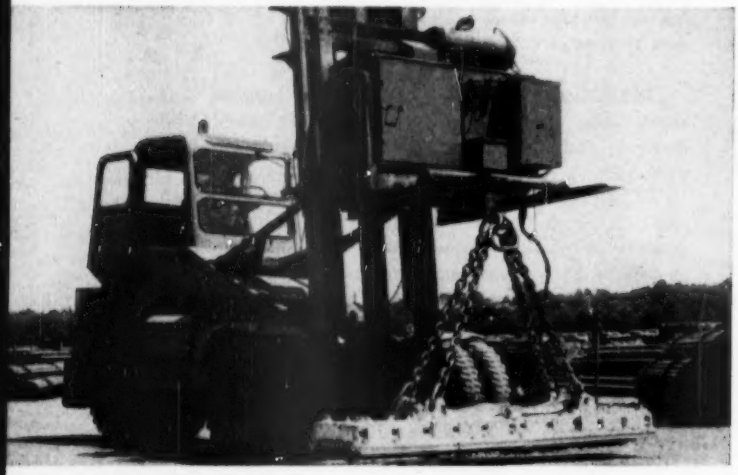


Space-Saving Inspection Layout

These optical comparator tables were designed at the Emporium, Pa., plant of Sylvania Electric Products, Inc., to give the most work surface in the least floor area.

Each table base holds two comparators, facing in opposite directions. Each inspector's work table extends across the back of the comparator next to hers, doubling work space.

Base and table supports are made of angle iron. Tables have plywood tops covered with hardboard, a drawer for tools, and a shelf for trays of materials. Labor and materials for each cost $75.



Magnet on Truck Clears Metal Off Roads

A magnet on a fork truck is used by The Timken Roller Bearing Company, Canton, to keep its 10 miles of plant roads free of metal debris. The roads are used by straddle trucks equipped with pneumatic tires. Since using the magnet Timken says savings in tire replacement and repair, tire-changing labor, and vehicle downtime are worth the trouble.

Magnet and generator were already available, can be mounted on fork truck in about 5 minutes. The 15-kw. gasoline-driven generator is carried on top of the forks, with the rectangular magnet suspended underneath from a spreader bar.

Labor Saved on Keeping Records

Problem: How to keep useful production records at Portage Machine Company, Akron, without hiring an extra clerk. Portage makes a variety of machines requiring many parts in small lots. Records—used for scheduling, estimating, payroll, and cost accounting—must show usual data plus actual and standard times.

Solution: The Robot-Kardex cabinet shown here. Each part has a record card. All cards for one machine's parts are grouped in a tray stored in the cabinet. To bring a tray to the work table, the clerk pushes a coded button.

Rollwelder Clips Welding Time 80%

This rollwelder, run by one man, does over five times more work than seven spotwelders run by seven men at Solar Aircraft Company, San Diego, Calif.

The $14,000 machine takes 45 minutes to make circular seamwelds to attach the afterburner fuel manifold on a jet engine exhaust-cone assembly—a 4-hour job for the seven spotwelders formerly used, which cost $49,000.

The rollwelder's head—the upper electrode—moves while the work stays stationary. The lower electrode is essentially an air-operated clamping fixture.

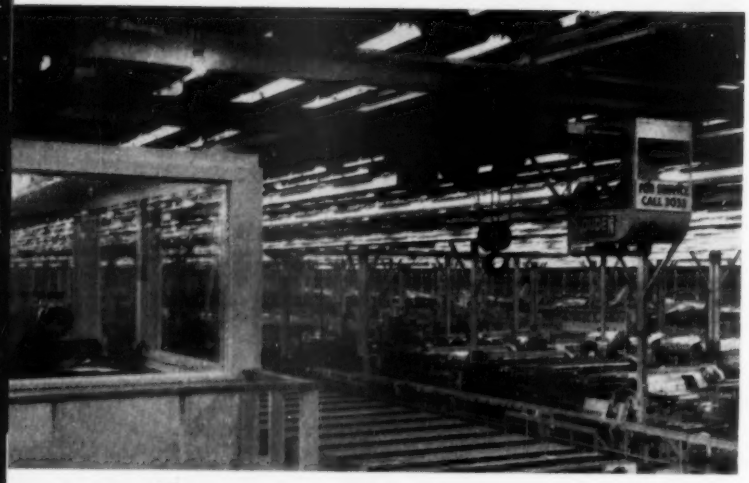
Tools Built From 'Erector Set'

An industrial "Erector set" has cut short-run production costs at General Electric's Evendale, Ohio, plant. It's used to build temporary jigs and fixtures for machining and assembly work—thus reduces the need for more expensive permanent tooling.

The set, called the Wharton System, has approximately 450 basic pieces—interlocking blocks, clamps, bolts, bushings, etc. Fixture can be quickly assembled to almost any design. After a tool has served its purpose, it can be disassembled and the pieces re-used.

Turn the page

OPERATING SHORTS . . . Begins on page 102



Radio Directs Overhead Cranes

A 2-way radio system speeds dispatching of overhead cranes throughout the 45-acre main building of Lockheed Aircraft Corporation's Marietta, Ga., plant.

Twenty-four crane cabs are radio-equipped for communicating with the central dispatching office (at left in photo). Any department can telephone the dispatcher for a lifting or moving job. He then radios the order to the crane nearest the department.

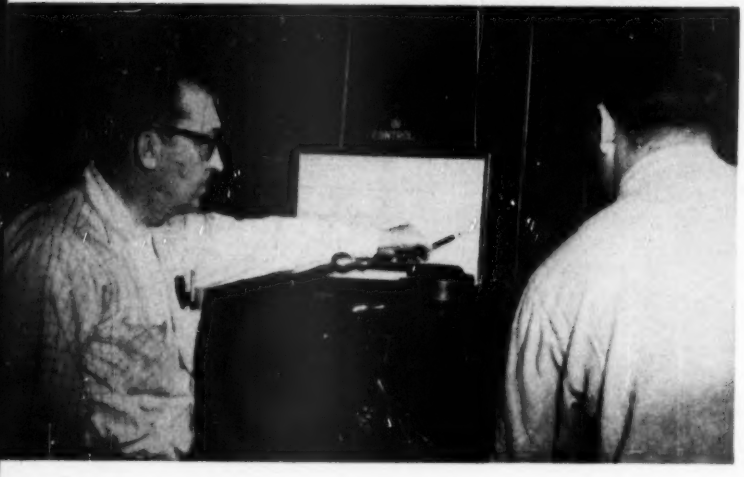
Lockheed's Marietta plant also controls mobile cranes and trucks—both industrial and highway—by 2-way radio.

Hoppers Store and Handle Materials

Bulk materials are not only handled but also stored in these specially designed hoppers at Norton Company, Worcester.

Hoppers hold measured amounts of materials that can be dumped right into process. A ticket on each hopper tells what's in it. For easy lifting by fork truck, the hopper has a plate with a flanged upper edge that fits over a lifting plate on the truck.

Racks were built to hold the hoppers, tiered three and four high in long rows.



Wooden Flags Signal Output Quality

A glance tells you this machine at Westinghouse Electric's Appliance Division, Mansfield, Ohio, is producing within quality standards.

The tip-off: that circular flag—labeled "in control" and painted green. If quality were below par, you'd see a red "out-of-control" flag instead.

The flags are opposite ends of a flat piece of wood that's screwed to the back of a quality-control board at each machine. At half-hour intervals, a patrol inspector sample-checks the work, then pivots the wood piece so that the appropriate flag is up.

CYCLE CHARTING—With "Handligs"

A quick new way to analyze and improve your materials handling methods

By **WENDELL W. PHILLIPS** • Manager, Raw Materials Handling
Eli Lily & Company, Indianapolis
and **SAMUEL W. EARLE** • Industrial Engineer
Haynes-Stellite Company, Kokomo, Ind.

WE HAVE DEVELOPED — and are using at Eli Lilly and Haynes-Stellite — a "cycle" technique that greatly simplifies the problem of charting materials handling operations. And the "cycle charts" we build to study handling sequences show us quickly where to cut handling moves that never should have been made.

OTHER BENEFITS • Our cycle charting technique has other advantages, too. **Cycle charts . . .**

. . . **can be made in 15% to 20% less time** than you'll need to make ordinary flow charts.

. . . **hold maximum data in minimum space.** They're usually one-fourth the size of standard flow charts.

. . . **show up handling waste graphically.** You can see at a glance where to make improvements.

. . . **provide a convenient form for calculating handling costs** when you want to compare two or more possible handling methods.

. . . **give you permanent records,** which you can easily read any time after they're made. They never grow cold.

. . . **are a big help when you have to "sell" top management** on better methods and equipment.

THREE TOOLS • To use our technique, you'll have to master three tools—the cycle concept, "handligs" (shorthand symbols), and chart construction.

This is the cycle concept

To chart something, it's necessary to work with recognizable units of motion or action. For that reason, we've established what we call "cycles" to identify units of materials handling. There are three kinds:

BASIC CYCLE • Materials handling tasks generally consist of four basic elements—*pick up, move, put down,* and *store.* (Sometimes other elements are mixed with these. We'll discuss them shortly.)

This basic cycle can be found wherever handling is done. Neither size, weight, nor shape of load affects the concept.

The basic cycle can be completely mechanical. When a man picks up a box and puts it on a belt conveyor, he completes a basic cycle. When a machine picks up a part, moves it, and puts it down, it completes a basic cycle.

SEMI-CYCLE • Let's go back to the man picking up a box and placing it on a conveyor. What he does is a basic cycle. But now consider the box as it moves along the conveyor. There is no "pick-up" or "set down" in this new movement cycle. The box is, in effect, in storage while it is moving.

This cycle, therefore, we identify as a *semi-cycle* because it hasn't all the elements a basic cycle must include. A fork truck or a crane, on the other hand, completes basic cycles because it has inherent ability to pick up, move, set down, and store objects.

MIXED CYCLE • This is really a basic or semi-cycle into which some other element or operation is introduced.

Suppose, for example, you pick up a piece, inspect it, and put it back on a tray. Introduction of the inspection element makes it a mixed cycle.

Or you may perform some fabricating or assembly operation while moving the part. The result is again a mixed cycle.

WHICH CYCLE IS WHICH? • Suppose you observe a man feeding pieces into a machine. He picks up a piece, moves it to a chuck, and inserts it. After the piece is machined, the machine unloads itself and ejects the piece onto a conveyor. Then, at some point along the conveyor, a man removes it and puts it on a pallet.

What kinds of cycles have we here? This breakdown will help to identify them:

Man picks up piece, moves it to chuck and inserts it.	**Pick-up Move Put down & Store**	**Basic cycle**
After piece is machined, machine unloads itself and ejects piece onto conveyor.	**Move Put down & Store**	**Semi-cycle**
At some point along conveyor, man removes it, puts it on pallet.	**Pick-up & Move Put down & Store**	**Basic cycle**

For a quick way to chart moves and describe moves symbolically, turn the page.

STANDARD INDUSTRIAL ENGINEERING SYMBOLS

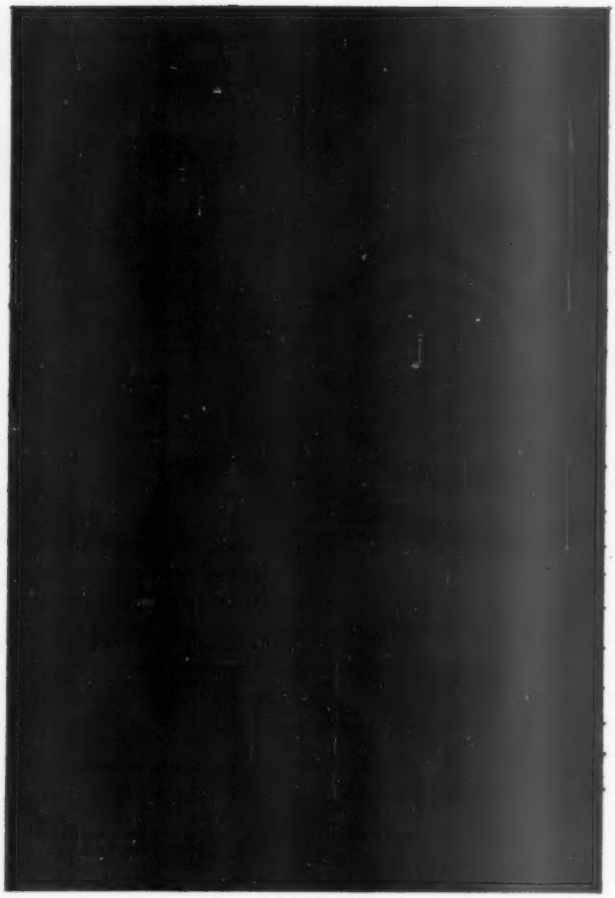
Delay · Operation · Transport
Inspection · Storage

YALE AND TOWNE SYMBOLS

Bridge · Elevator down · Ramp up-down
Doorway · Elevator up · Road

HANDLIGS

Bag
Box or carton
Carboy
Conveyor — gravity
Conveyor — powered
Crane — overhead
Crane — yard
Dock
Dolly
Dragline — floor
Dragline — overhead
Drum
Elevator — automatic
Floor designation
Gas cylinder
Hand truck — platform
Hand truck — two wheeler
Highway truck — body type
Highway truck — body type, holding 6 pallets (boxes, etc.)
Highway truck — tractor trailer
Hoist
Man
Monorail
Pallet or skid
Pallet — 10 packages on
Pallet — 2000 lbs. weight
Pallets — two
Pallets — two — 10 on — 2000 lbs.
Pallet rack
Pipe line
Pump
RR car — box
RR car — flat
RR car — hopper
RR car — refrigerator
RR car — tank
Skid bin
Supplier
Tank
Tote box
Tractor trailer — with 4 trailers
Truck — hand pallet or skid jack
Truck — high lift fork
Truck — high lift fork with 1 trailer
Truck — high lift walkie
Truck — low lift
Truck — low lift fork
Truck — low lift fork with 2 trailers
Truck slide (from tailgate)



With the above symbols . . .

With the cycle concept set up, we wanted a way to say things like this quickly and graphically:

"A low-lift fork truck picks up a pallet loaded with 20 bags of chemicals weighing 2000 pounds from a dock and moves it 125 feet to an elevator. The truck lowers the pallet to the elevator."

For this purpose we developed symbols we call "handligs." We use them along with standard industrial engineering symbols and handling symbols developed by The Yale & Towne Manufacturing Company. They are all shown above.

What we really want to symbolize is: *what was moved, from where, how,* and *to where.* Consulting the symbols we get this shorthand:

What—the pallet load—becomes 2000 / 20

From where—the dock—becomes ⌜

How—the low-lift fork truck—becomes ⌟

To where—the elevator—becomes ∧

Thus, our shorthand becomes 2000 / 20 ⌜ ⌟ ∧

. . . this typical handling sequence . . .

Our list of symbols certainly isn't complete. There is no reason why they can't be augmented by others you develop for your own use.

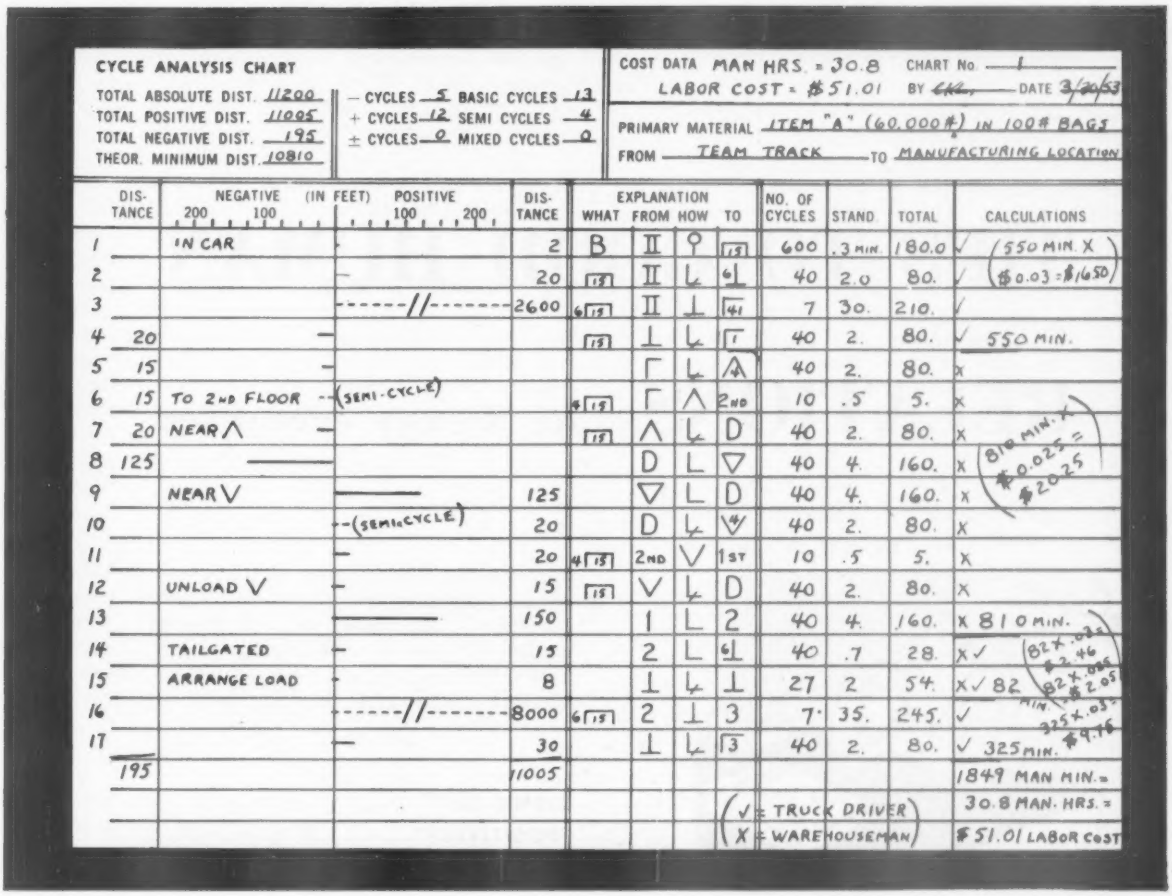
BUILDING THE CHART · Important in the charting stage is one more element. You have to decide when a move is positive in nature, when it is negative.

A *positive* move is one in which the load is moved in a direction approximating straight-line flow.

Any real deviation from that approximation is a *negative* move.

Sometimes a move may be both positive and negative. If a fork truck, for example, must follow a devious route to reach its objective, some of the distance will be negative, some positive.

It's important to understand and use this idea because then you can identify moves as negative or positive on a chart, along with distances involved. And with that information it is easy to total up negative moves and positive moves. These totals can then be used to show how much excess handling is being done.



CYCLE ANALYSIS CHART

TOTAL ABSOLUTE DIST. 11200 — CYCLES 5 BASIC CYCLES 13
TOTAL POSITIVE DIST. 11005 + CYCLES 12 SEMI CYCLES 4
TOTAL NEGATIVE DIST. 195 ± CYCLES 0 MIXED CYCLES 0
THEOR. MINIMUM DIST. 10810

COST DATA MAN HRS. = 30.8 CHART No. 1
LABOR COST = $51.01 BY [illegible] DATE 3/20/53
PRIMARY MATERIAL ITEM "A" (60,000#) IN 100# BAGS
FROM TEAM TRACK TO MANUFACTURING LOCATION

	DIS-TANCE	NEGATIVE (IN FEET) 200 100	POSITIVE 100 200	DIS-TANCE	EXPLANATION WHAT	FROM	HOW	TO	NO. OF CYCLES	STAND.	TOTAL	CALCULATIONS
1		IN CAR		2	B	II	⚲	15	600	.3 MIN.	180.0	✓ (550 MIN. X $0.03 = $16.50)
2				20	15	II	↳	6	40	2.0	80.	✓
3			------//------	2600	6 15	II	⊥	41	7	30.	210.	✓
4	20				15	⊥	↳	1	40	2.	80.	✓ 550 MIN.
5	15					⌐	↳	A	40	2.	80.	X
6	15	TO 2ND FLOOR (SEMI-CYCLE)			6 15	⌐	∧	2ND	10	.5	5.	X
7	20	NEAR ∧			15	∧	↳	D	40	2.	80.	X
8	125					D	L	▽	40	4.	160.	X (810 MIN. X $0.025 = $20.25)
9		NEAR ▽		125		▽	L	D	40	4.	160.	X
10			(SEMI-CYCLE)	20		D	↳	V	40	2.	80.	X
11				20	4 15	2ND	▽	1ST	10	.5	5.	X
12		UNLOAD ▽		15	15	▽	↳	D	40	2.	80.	X
13				150		1	L	2	40	4.	160.	X 810 MIN.
14		TAILGATED		15		2	L	6	40	.7	28.	X ✓ (82 X .03 = $2.46; 82 X .025 = $2.05)
15		ARRANGE LOAD		8		⊥	↳	⊥	27	2	54.	X ✓ 82 MIN.
16			------//------	8000	6 15	2	⊥	3	7	35.	245.	✓ 325 X .03 = $9.75
17				30		⊥	↳	3	40	2.	80.	✓ 325 MIN.
	195			11005								1849 MAN MIN. =
								(✓ = TRUCK DRIVER)				30.8 MAN. HRS. =
								(X = WAREHOUSEMAN)				$51.01 LABOR COST

...can be quickly cycle-charted—and analyzed

A HYPOTHETICAL PROBLEM · This concerns a 60,000-lb. load of bagged chemicals that came to a siding from an out-of-town supplier. Each bag weighs 100 pounds. The bags aren't palletized.

To see what happens, cast your eye down the exhibit, top right on the facing page. It lists the 17 moves in the complete handling sequence.

The point at the moment, however, is to show how adequately cycle charting will tell in symbols the same story that the exhibit tells in words.

To make this comparison, we have drawn lines to connect each of the 17 moves to the line on the chart (above) where it is expressed in symbols. Now refer to the list of symbols to see how each move is written in shorthand.

You will note that the columns marked *negative* and *positive* in the chart are divided by a vertical line. Negative moves start at the line and are drawn to the left. Positive moves start at the line, and move right.

A cycle that is partly positive and partly negative is charted on both sides of the line.

Above the columns are scales, in feet, for helping you to judge the approximate length of the line.

Basic cycles are identified in the *negative* and *positive* columns by unbroken lines. Semi-cycles are identified by broken lines.

ASSIGNING COSTS · The last four columns provide space for finding costs by cycles, and in total. In the column marked *stand.*, put down the standard time for each cycle. (We use standards, but you can insert stopwatch readings here if you wish.)

Then multiply standard time by number of cycles to get total time. (We've used hypothetical standards to keep the illustration simple.)

Once you have total time, you multiply it by the wage rate of the person or persons involved. This calculation can be made in the last column in as much or little detail as you desire.

We've carried the caluclations out to find pure labor cost to show how it's done on the chart.

Summary information is then put in the appropriate boxes at the top of the chart.

TIPS TO GOOD HUMAN RELATIONS for factory executives

GUILTY CONSCIENCE Remember the "Tip" (p. 125, June 1953) about the bad manners and poor management of the employment office receptionist? Within a couple of weeks after the issue appeared, three personnel managers phoned FACTORY to inquire, "Was that *my* employment office you were writing about?" In each case the answer was, "No." Apparently the man responsible for the condition reported still hasn't tumbled to what's going on.

Anybody else got a guilty conscience? If so, don't bother to call FACTORY. We're not talking — except to advise that if you think it might be your plant, better take some action before you possibly lose more community good will.

PUBLICATION FOR PRE-RETIREES Monthly magazine called *Lifetime Living* is edited especially for folks 45 to 65 who want to start planning ahead to retirement. Already a handful of big name companies are buying it for their over-55 or over-60 employees as part of a retirement planning program. A few are sending it to retirees. Individuals can subscribe at $2.50 a year. For group rates and a sample copy, mention FACTORY in a request on your letterhead. Write: Lifetime Living, 22 E. 38th St., New York 16.

DIDN'T SAY "POSITIVELY" You remember the man who failed to "keep off the grass" because, he explained to the judge, the sign didn't say "positively."

Not long ago, we ran into the same situation with regard to smoking. Found it in a notice circulated to "all employees" by the personnel manager of a company that could have brought to bear a million dollars' worth of copy-writing talent on saying "positively" in a dozen languages. Yet the notice read like this:

"It is imperative that the no-smoking rule be observed at all times, but it is particularly important during these summer months when lighter and more flammable clothing increases the hazard."

That's right, he definitely and absolutely didn't say "positively."

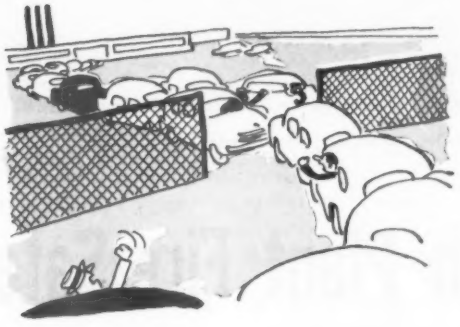
HOW TO GIVE 'EM ALL THE FACTS One of the most complete financial reports to employees we've ever seen appears each month in the *Newsrator*, publication of the Fisher & Porter Co., Hatboro, Pa.

There's a summary P&L statement for the previous month's operation, and a balance sheet showing the financial position as of the end of the month. Orders received, shipments, and

backlog are listed, together with a computation showing how many weeks' work this represents. Book value of F&P's stock is shown, along with an appropriate note that the stock is not registered with the Securities & Exchange Commission, and just what that means.

One reason for the extensive financial report is this statement of policy in the employee handbook: "No F&P employee is ever laid off due to lack of work as long as the business can continue to be operated at a profit, or at a break-even point."

By the way, this handbook is top-notch all the way through. The section on lateness is a gem — especially for executives. Keith Hafer, company's director of human relations, says he'll be glad to send you a copy of either the handbook or *Newsrator*.



UNBLOCK THAT TRAFFIC JAM! Have you been listening for squawks from your workers about traffic jams making life miserable on the way to and from the plant?

Now Bell Aircraft in Niagara Falls has tried an approach that is so simple it might be overlooked. Alternate routes were mapped and traffic densities on each checked. Then Bell published a cartoon map on the front page of its employee newspaper, showing the alternate routes in good detail. Accompanying article analyzed distances, stop lights, traffic volume, on each. Really helped.

LONGER WAIT FOR SICKNESS BENEFITS? How long to make a man wait before he starts collecting benefits under a sickness and disability plan has always been a tough questioin. The approach has often been: "Short as possible, but long enough to eliminate the colds, hangovers, and fakes."

A somewhat different tack has been suggested by Robert E. Sibson, labor relations research consultant, of New York. He makes the point that the average worker can probably survive being out of work for two or three weeks (hundreds of thousands are on strike that long every year). But the worker is really devastated by an illness of many weeks or even months. Most benefits run out after a few weeks. So why not increase the waiting period a bit, and then extend the maximum benefit period to the point where you get the same total cost?

By cutting benefits for everybody for a few days at the start, says Sibson, you could extend tremendously the covered period for the few people who really need it. We can see some practical problems, especially in bargaining, but the idea seems to be worth kicking around.

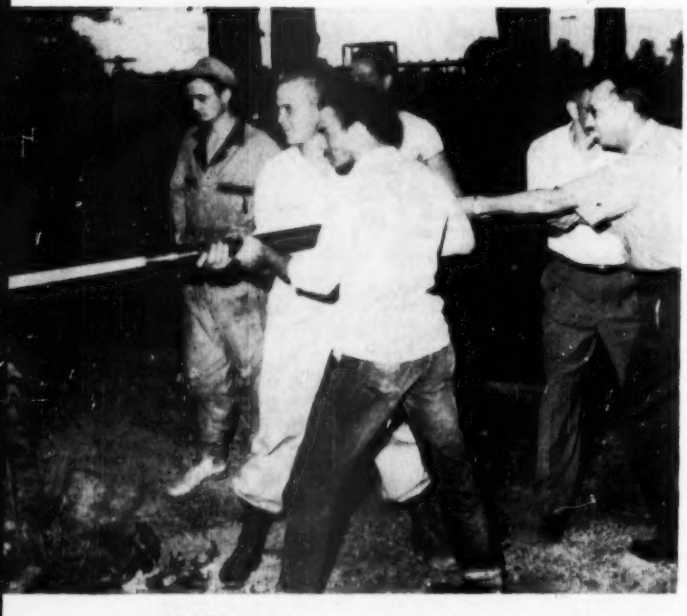
TAKES WATER TO CATCH WATER Well, something like that. Point is, if any of your employees are wearing cellulose sponge sweatbands, remind them that they'll get better results by wetting the sponges and then squeezing them dry before wearing. Actually, a sponge in this condition — just slightly damp — will do a more efficient job of absorbing perspiration, keeping it out of eyes and away from goggles. Besides, the dampened sponge is more comfortable when placed against the skin.

WISE OWL CLUB IN HIGH SCHOOLS You've heard before about the Wise Owl Club — the 4000 industrial employees who have had their sight saved by wearing safety glasses. So why should you be interested in the fact that a Milton, Pa., school boy became a member recently?

Because a lot of high schools have machine shops these days, and too few are equipped to supply safety glasses to students. If you're on the school board, in the PTA, or have a boy in school, you can do a real service by some checking up and action urging. Might be a good chance for your company to earn some good will by supplying safety glasses.

TRAINING MEN TO USE THE RIGHT EXTINGUISHER IS PART OF EVANS PRODUCTS PROGRAM FOR ...

...Keeping a Suburban Plant Fire-Safe



HOSE PRACTICE convinces fire-fighter trainees at Evans Products that it takes four husky men to manage a 2½-in. hose.

By **LEE ROY ANGLIN** • Lieutenant
Plant Protection Department
Evans Products Company, Plymouth, Mich.

OUR TOWN OF PLYMOUTH is about 30 miles west of Detroit. It's like hundreds of other suburban towns —a pleasant, residential community of shopkeepers, retired farmers, and auto-plant workers.

Plymouth originally had one major industry within its town limits. In the industrial trek to open spaces, it has acquired in the last 10 years four more plants on its outskirts, each employing over 1000 people. Evans Products is one of them. It's built of masonry and brick, with a few outlying wood storage sheds, aggregating some 400,000 square feet of floor space.

In case of fire, we knew we couldn't expect a full array of fire-fighting equipment at our door in a matter of minutes. Yet those first precious minutes often decide the fate of the plant. So we set about building a well-trained corps of fire fighters among our own labor force.

We had to start from scratch. But we now have men and equipment to cope with all but a major disaster. And even then our men could assist professional firemen. This was our approach. ——→

1 · Leader Training

First step was for Fred Martin, chief of plant protection, and me to educate ourselves more fully on the subject of fire protection.

We enrolled in a series of courses offered by the Michigan Civilian Defense organization and the Detroit Safety Council in conjunction with the Detroit city fire department. I won't say we became professional fire fighters. But we came away with increased knowledge of modern methods and equipment so we could train our own staff of 60 auxiliary firemen.

2 · Equipment Inventory

Next we reviewed our fire-fighting facilities. We plotted the plant according to kind of production work in each area—torch cutting, painting, wood-working, with various combinations of each under one roof.

Then, assuming a maximum fire hazard in each area and for each type of work, we re-assigned our available equipment according to need, and bought new equipment designed for specialized fires. In addition, our plant has over-all sprinkler equipment, with water tank, fire pump, and water supply to meet various code and insurance standards.

Periodic check. In our plant-protection office we keep close tabs by card file on every item of fire-fighting equipment—some 210 extinguishers, 4 hose houses, 16 hose reels, stirrup pumps, gas masks, lanterns, fire axes, sand drums, water drums. The case history of each piece is carefully documented in our records.

We keep these fire-fighting facilities up to date by a continuing check. For example, we check the condition of hose lines and nozzles, the potency and recharge date of hand equipment, and the accessibility of equipment for prompt action.

In the same office there is a floor plan of the plant, carrying variously colored pins to designate the location and type of equipment. It gives us a complete picture of this equipment and helps us match the type to the local hazard.

3 · Fireman's Manual

Another step before training our men was compiling a 33-page pocket-sized fireman's manual. This was written specifically for our own plant, our own fire-fighting equipment, and our own protection requirements.

The manual cost was $300 for 500 copies—enough for future needs. It describes the ordinary kinds of fires and the proper methods of extinguishing them. It also covers special kinds of fires, such as magnesium, zinc, and aluminum.

The bulk of the manual deals with instructions on how to operate each type of unit, including the wet and dry sprinkler systems. One specific caution is repeated throughout on what to do with an extinguisher after use: Don't return it to regular location; leave it at scene of fire, and notify plant protection.

We use eight kinds of hand extinguishers. We have wheeled CO_2 and Foamite carts. There are three automatic CO_2 systems. All are discussed in the manual. It also contains a code of fire alarm signals, so manpower can be quickly concentrated when and where needed.

4 · Training Program

With the manual in shape, we were ready to recruit and train our 60-man force. Among the qualities we sought in our trainees were:

1. Reliability—men with good work records and attendance records; in many cases shop stewards, in any case, men we could count on.

2. Adaptability—men who could grasp instructions easily and learn to function coolly in an emergency.

We set our sights on getting two men from each department on each shift. The extra man is a hedge against the regular man's absence because of illness or vacation.

As soon as the men we selected had absorbed the contents of the manual, we began intensive training in handling fire-extinguishing equipment. We set up an outdoor training ground where trainees from each of the three shifts were given an hour's demonstration of equipment. Then we built Class A, B, and C fires for them to put out, using both the wrong and the right methods. Thus they learned quickly what each type of extinguisher could and couldn't do.

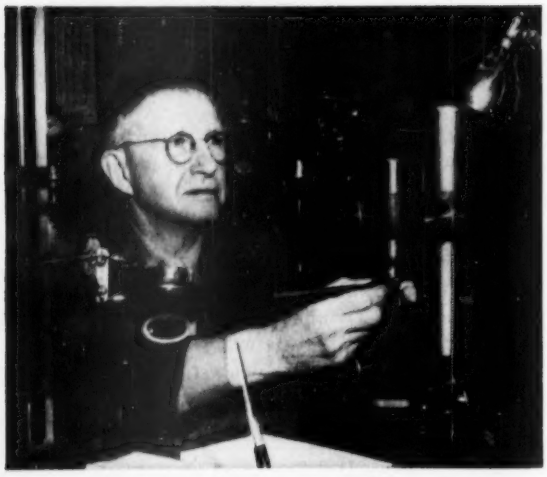
We plan to continue field and book training on a regular basis, gradually working into special training for special problems in certain areas. We want our fire brigade to be more than a first-aid unit. And we believe it's just as important to train them in fire prevention as in fire extinguishing.

Other than myself we have no full-time firemen —and even I double as assistant to the safety supervisor. All our firemen are subject to call at any time if the situation warrants it. And all our regular plant protection men have been trained as auxiliary firemen.

To date we've had only one fire of enough consequence to merit investigation by insurance adjusters. Our attitude is not that a fire can never happen. Rather, we aim to be able to extinguish any blaze that does occur, and not let a similar one happen again.

Good gage records...

Good gage storage crib...



Good gage inspection...

1. **Master gage blocks**—every 12 months.
   Rockwell hardness indicator—almost every use, every month at a minimum.
   Profilometers—quick check before every use, complete check every 12 months.
2. **Gage blocks**—every 12 months.
   Masters for setting adjustable gaging equipment—every 12 months, and on suspicion of error.
   Thread-setting plug gages—if in frequent use, every month. If used infrequently, every six months at a minimum.
3. **Cylindrical plugs**—every month or two months, depending on amount of usage. Every six months at a minimum.
   Thread plugs—every month.
   Thread rings—after each use.
   Adjustable gages—before each use. *No inspection or usage record is maintained on these gages, since they are not subject to wear. They are inspected to be sure they are not out of adjustment.*
   Fixed-dimension gages (angles, templates, etc.)—every 12 months at a minimum, more often according to usage. *The 12-month maximum is allowable here because they are special-purpose gages and therefore infrequently used.*

Good inspection timetable...

...All add up to

Gage Control That Cuts Rejects to 2%

By RALPH HIXENBAUGH • Chief Insgactor
Aeroquip Corporation, Jackson, Mich.

Some people kid Aeroquip executives about the amount of equipment used, and the time and money spent, on gage control—for "fooling with millionths." It's worth it, they answer: "Good gage control is the backbone of quality control."

AEROQUIP MANUFACTURES flexible hose lines; detachable reusable hose fittings; and self-sealing couplings—not what you might think of as "precision" products requiring a large investment in gaging. However, we have found from experience that a "large" investment in gaging is both necessary and economical.

We own a lot of gages (over 6000, which are valued at more than half a million dollars and would cost three times that to replace). We have a complete, well-equipped, air-conditioned gage

laboratory. We also have what some people might call an elaborate system to make sure our gages are accurate. We keep lots of records (six filing cabinets full). But we don't think we have "too much gage control." Our reasoning comes to this:

1. Whatever degree of accuracy is required in finished parts, you can't find out if those parts are good unless you *know* the gages used to inspect those parts are correct.

2. The number of rejected parts, once higher than we'd care to announce here, is down to less than 2%, even on tough-to-make parts—and we've got some tough ones.

3. We have more than 100 vendors making parts for us. If we didn't control the gages they use in inspecting these parts, we'd be getting 100 ideas of accuracy, 100 ideas of interchangeability, 100 ideas of allowable wear on gages. We supply our vendors with all necessary gages, which they return to us every 30 days for checking.

4. If you don't have good gage control, you're "at the mercy" of your suppliers. The most reputable supplier makes mistakes, just as you do, and unless you can inspect incoming pieces—and gages—with the assurance that you're right, you're in for production headaches.

5. With our present record system we've eliminated losses which have been a problem.

Gage lab is air-conditioned

We're proud of our gage laboratory. It's well-equipped. We keep the temperature at 68 degrees, the humidity at 50% or less to insure dimensional stability of our gages.

We have two gage crib attendants and two gage setters on the day shift, one of each at night. And during the day only, our gage engineer, his assistant, and two gage inspectors man the lab.

Laboratory equipment includes a master set of gage blocks, class "A" and "B" sets of gage blocks, Swedish Mikrokater visual comparators, Balcrometer measuring instruments, several hardness testers, two contour projectors and measuring machines, super micrometers, optical flats, profilometer, as well as all standard small instruments and gages such as sine bars, vernier height gages, steel squares, precision bench centers, etc.

We also have what we believe is a unique gage—our "Drunken Thread Checker." This instrument was designed by our gage engineer, John Starbuck, and engineered and built by Aeroquip. Its job: to measure the amount of deviation of the true helix of a thread (this deviation got the name "drunken threads" from the wavering characteristic in the helix or spiral of the thread).

Starbuck realized the need for this gage when only one of two identical 13/16-in., 20-pitch thread plug gages would mate with a part under inspection. Final licensing agreements with a gage manufacturer have been completed, and we're sure this new gage will soon be part of many other well-equipped gage labs.

For checking internal dimensions (like checking a thread-plug gage) we use a thermal-setting plastic. The gage is set on a flat surface, and the plastic, in liquid form, is poured in. At room temperature, it sets to a rubber-like consistency; and the cast of the inside of the gage can be pulled out. Baked, it hardens, and the plastic cast can be measured with gages, or checked on the optical comparators.

How often are gages inspected?

The maximum period between inspections varies for each type of gage. Our practice is outlined in the table on the opposite page. In addition:

1. All gages used on final assembly inspection are checked weekly.

2. All gages used on production, either by Aeroquip or vendors, are checked on return to crib.

How is the "maximum period between inspections" established? This is a period which, in our experience, is short enough to eliminate the possibility of that type of gage wearing beyond the dimensional limits between inspections. You'll note, for example, that our master gage blocks are inspected only once a year (by the National Bureau of Standards). That's because these gages are used relatively infrequently and only in the gage lab for checking other gage blocks. On the other hand, gages that are used out in the shop are inspected at least every month.

We've tried, and are still trying, to find out how many pieces a given kind of gage can be used on before it wears excessively. But with so many variables—rough threads, burrs in holes, care taken in using the gage—we've found that a time basis for inspection is the best available.

How do we make sure that all gages are inspected on schedule? First, we use a signal on the visible margin of each pocket to mark the last inspection date. Second, at the time of the regularly scheduled inspections, *all* gages of a particular type and size are inspected at one time. Gages lent to vendors must be returned monthly for this inspection.

Calling in all gages of a particular type and size at one time may disrupt production. But usually we can avoid this by inspecting the "spare" gages in the crib first, then "trading" these to production or vendors for the ones they have out.

Our production people have been pretty well trained to turn in for inspection all gages they feel may have been damaged. But, if they are unaware that they've damaged the gage, and if bad parts begin to show up farther down the line, the first thing that's done is to inspect all gages used to inspect the part. This at least minimizes bad production due to out-of-adjustment gages.

Turn the page for Aeroquip records

GAGES REQUIRED		GAGES AVAILABLE			GAGES ORDERED	DRAWING INFORMATION		
DESCRIPTION	NO. REQ'D	GAGE NO.	NO. AVAILABLE	DESCRIPTION	DATE	DATE AND LETTER OF LAST CHANGE	ORIG. NO.	DATE OF ISSUE
1 1/16-16N2- P.D. 1.0272 1.0219	3		7	THREAD PLUG GAGE	7/3/51		1	1-9-52
979-986 I.D.	3		9	CYL. PLUG GAGE				
1.097-1.107 WIRE GROVE DIA.	3	G751-38	3	GAGING FINGERS				
603-613 WIRE GROVE LOCATION	3	G764-2	3	LOCATION GAGE				
608 MASTER	1	G764-17M	2	LOCATION MASTER				
128-.133 WIRE GROVE WIDTH	3	G779-5	3	WIDTH GAGE				

PART NAME Nut. PART NO. 12345-6 6-1-51

1. GAGE LIST SHOWS ALL GAGES THAT ARE NEEDED TO INSPECT A GIVEN PART (HERE A NUT, PART NO. 12345-6).

SIZE 1 1/16-16 DESC. N2 Th'd Plug Gages

VENDORS

1 Th'd Gage Co. 3 Doe Co.

2 Jones Co. 4

GO 1.0219 NO GO 1.0272

USED ON PART NUMBER

9876-4, 1557.9, 12345-6

PURCHASES (GO)				RECEIPTS				
DATE	VEN.	P. O. NUMBER	QUAN.	DATE	QUAN.	REJECTS	REPL'D REPAIR	BAL.
12/15/51	1	603664	6	1/10/52	6			6
						1		5
1/16/52	3	684522	3	1/18/52	3			8
						1		7

PURCHASES (NO GO)				RECEIPTS				
DATE	VEN.	P. O. NUMBER	QUAN.	DATE	QUAN.	REJECTS	REPL'D REPAIR	BAL.
12/15	1	603664	6	1/10/52	6			6
						1		5
1/16/52	3	684522	3	1/18/52	3			8
								7

2. GAGE INVENTORY RECORD TELLS AEROQUIP PEOPLE HOW MANY GAGES OF A GIVEN TYPE AND SIZE ARE ON HAND.

DESC. 1 1/16-16 MAX GO 1.0222 NO GO 1.0272 MIN GO 1.0219 NO GO 1.0269 ORDER NO. 603664

INSPECTION RECORD				DATE OF USAGE			
DATE INSP.	INSP. BY	ACTUAL SIZE GO MEMB	ACTUAL SIZE NO GO	OUT	IN	OUT	IN
11/20/52	V.T.	1.0221	1.02715	11/24/52	1/24		
2/20	V.T.	1.0221	1.02715	1/25/52	1/30		
3/25	"	1.02205	1.02710	2/3	2/29		
4/21	"	1.0220	1.0271	3/4	3/6		
				3/7	3/15		

GAGE NO. 4

3. INSPECTION RECORD IS COMPLETE "PERSONAL HISTORY" OF EACH GAGE.

GAGE LOAN ORDER

SIZE 1 1/16-16 N2 P.D. 1.0219 1.0272

DESCRIPTION Th'd Plug Gage

GAGE NO. #1

FOR PART NO. 12345-6

Date Received	1/22/52	Signed	Potter
Date Returned	1/24/52	Signed	Pepper

4. LOAN ORDER TELLS WHERE GAGE IS.

← Four Forms Keeps Aeroquip Gage Control System Perking

1. GAGE LIST · Let's run through the "life history" of a typical gage. It all starts when a new part is designed. As soon as the blueprints and specifications are completed and approved, a gage list (Figure 1) is made up. The list shown is for a nut, part number 12345-6. Notice that the gages required to inspect the part are listed by dimensions (first column) and by name (fifth column).

For example (and this is the gage we'll follow through with) the first gage listed is a thread plug gage, 1 1/16-inch diameter, 16 threads per inch. The "number required" (second column) to inspect the projected production of that part is three. In the fourth column is listed the total number of gages of that size which we own. (This figure is obtained, as you'll see, from the *gage inventory record* (Figure 2) and varies as gages are rejected and replaced. Whenever the balance in inventory changes, this list is posted.

This gage list insures procurement of any gages needed; also speeds the filling of gage orders needed for vendors and shop departments.

2. GAGE INVENTORY RECORD · This record (Figure 2) is kept for every size of every type of gage (but not every individual gage). The gage we're considering, remember, is a 1 1/16, 16-threads-per-inch plug gage.

Note that the vendors who furnish this type of gage and the vendor from which each purchase was made are recorded. This information is valuable in case we have to return the gage, and for studying comparative accuracy, service life, etc.

On this form, all purchase requests, receipts, rejections, and repairs are posted. And in the column at the right, a perpetual inventory is kept. (This is the figure posted to the *gage list*.)

The last bit of information on this form is at the upper right: "Used on part number." Here are recorded all the part numbers on which this type and size of gage is used. Note that this gage is used on three parts, including our nut—part 12345-6. This information helps us decide how many we should have on hand. This is not simply a matter of mathematics because seldom, if ever, are all three parts being made at any one time. But this calculation does tell us the maximum number we should have. The actual number is a matter of judgment and experience.

3. GAGE INSPECTION RECORD · When gages are received from the manufacturer, they are immediately inspected in our gage laboratory. If they are accepted for use:

1. The *inventory record* is posted. As noted previously, the "number available" column on the *gage list* is also changed.

2. The gage is assigned a number, which is permanently electro-etched or stenciled on it.

3. A *gage inspection record* (Figure 3) is made out, *if* the gage is subject to wear. To be exact, there is an inspection record for every master for setting adjustable gaging equipment, thread-setting plug gage, cylindrical plug, thread plug, thread ring, and fixed dimensional gage. There is *no* gage inspection record for master gage blocks, hardness-indicator gage blocks, and adjustable gages. They are not subject to wear, either by nature (i.e., micrometers) or because of their infrequent use. The lab people do, however, keep a calibration record on these gages. This "personal history" form for that individual gage shows its number.

Note, at the top, the allowable limits on *go* and *no-go* dimensions. Also at the top: the purchase order number, which ties this form back to the *inventory record*.

When the inspector checks the gage (on receipt and during re-inspection), he notes the date and the actual measured dimensions of the gage, and initials the form. At this time, the *inventory record* is posted. Note that re-inspection of this gage occurred at monthly intervals.

On the right-hand side of this form are recorded the dates on which the gage was signed out and in. This data comes from *gage loan orders* (Figure 4).

4. GAGE LOAN ORDER · This form is made out every time a gage goes out to a vendor or to the shop. Three copies are made. The first copy is placed with the *inspection record* (in the folder mentioned just below). The gage crib attendant posts the "usage" column at this time. The second is filed in the gage office under the name of the vendor or production department to which the gage was sent. With this cross-indexing, we can determine the location of any particular gage, or find out what gages a given vendor or production department has out. The third copy goes with the gages.

A word about the physical set-up for these gage forms. The inventory record for a particular type and size of gage, and all of the inspection records for gages of that same type and size are kept together in one Kardex pocket. In the visible margin of this pocket is noted the description of the gage whose records are in that pocket.

For example, the visible margin of the pocket in which the forms we've discussed are located would read: 1-1/16-16; Go 1.0219; No go 1.0272. Since all thread plug gages are kept in one drawer of the cabinet, it's not necessary to put the type of gage in the margin. Also in the margin: the shelf and drawer number in which the gages are located in the crib.

A Toby Quint Episode:

"Why, you old buzzard! This is dated November 18, 1941."

The Old Man Squints Backward—to Look Ahead

By RAY W. SHERMAN

THE OLD MAN, who was "'Horace R. Peters, President," on the payroll, and "Hod" to the oldtimers in Central Manufacturing, had a system.

Things he didn't know what else to do with he dropped into the top right drawer of his desk. When the drawer got full he went through the heap, threw most of it away and started again.

His wastebasket was well filled now. He was putting a few pieces back for a nest egg when over the back partition in the drawer peeked a paper. The Old Man pulled, and out came a wrinkled flimsy carbon of a memorandum.

Smoothing it on his desk, he said: "H'm-m-m," and lifted the phone. "Can you come up?" he said, after a moment, to Plant Manager Tobias Quint. Then he opened the top left drawer, drew out a cigar and rolled it to the side of the desk where Quint would sit.

Toby arrived, sat down, lighted the cigar, and waited. The Old Man "h'h-m-med" some more.

"I sent you a memorandum, Toby." Studying the top of the wrinkled sheet, he added: "Title—Overtime in Maintenance Department."

"Memo? Overtime?" Toby's keen eyes squinted.

"Right here!" The Old Man slapped the sheet. "It says: 'What are we going to do about overtime in the maintenance department?'"

Toby was blinking, puzzled.

"Guess it must be in the mail on my desk," he said. "Haven't got to the bottom of it yet."

"It says—" the Old Man held the flimsy between his thumb and forefingers "—that the maintenance men try to stretch out their work. They slow down to make overtime. They are deliberately inefficient. And —" the Old Man was emphatic "—it says here that we know all about it, but let 'em get away with it as a matter of policy. And the

result is we're back to a 60-hour week in a 40-hour age. The whole plant knows about it and thinks the maintenance crew is getting away with murder—and we're dopes. It says —"

"Gimme that thing!" Toby snatched the sheet out of the Old Man's hands and began to read. The Old Man grinned as Toby's eyes suddenly shot to the top of the paper.

"Why, you moth-eaten old buzzard," he snapped, "this is dated November 18, 1941!"

Softly the Old Man said: "So-o-o-o?"

"There's been a world war since then!"

"Sure!" The Old Man leaned back and drummed the desk. "There have been a lot of changes in the world but —" he hesitated "— what change has there been in what's in this memorandum?"

"None, I guess." Toby slid it back across the desk. "I do remember it now. Pearl Harbor came right after that."

"I'd forgotten it, too." The Old Man picked the sheet up again, studied it a while. "But, Toby—can't we do something about this? It isn't right. It never was. It's cockeyed management. So far as I know we're doing it the same way we were when I wrote this memorandum twelve years ago."

"I guess we are." Toby watched a beautiful smoke ring climb. "But what to do?"

"I don't know, either. But —" the Old Man laid down the sheet "— if there *are* inequities in our wage scale, we ought to fix 'em somehow. Maybe it wouldn't cost as much as we think. If we paid more but demanded real production, maybe we'd get more for our money.

"*You* know—and *I* know—that a man who works on a Sunday—even if he does get doubletime—doesn't do half as much as he would on a regular shift. Not only is he tired, but he is surrounded by a silent, shut-down shop and a relaxed world. And he relaxes, too. So we pay twice the rate for half the work and that makes it cost four times as much.

"Also, overtime that could be done in two hours never stops there. A gang that comes to work at eight on Sunday morning always works till noon."

"Well, the kind of men you get—"

"Oh, I know. But let's don't blame the men. They haven't changed since you and I worked by the hour. Being undermanned so you don't have to lay men off if work gets slack is a fine theory, but what about the cut men have to take if there isn't any overtime?

"We've got to have better planning, too. Jobs that will take time should be started sooner, somehow or other. Surely we can do better—"

"Maybe—" Toby still studied the ceiling "—we should get together with Jack Dean of Maintenance, Eddie Lee of Personnel, ask the office to make a study of the figures, and see what we can work out."

"Swell!" The Old Man reached for his date books: "Tuesday. Ten o'clock. I'd hate to see twelve more years go by before we at least talk about it."

If complex cuts are your problem . . .

. . . you'll want to read about a new ultrasonic machine tool. It's fast, accurate—machines fancy shapes or drills ordinary holes in hard steel, glass, ceramics, even precious metals. For details and pictures, see What's New in Equipment. **Page 140.**

How do you slash insurance rates?

Crest Company sliced its premium from $25.50 to $5.10. You can find out how in Maintenance Pointers. Here's where Maintenance Editor Carl Wyder puts out maintenance ideas that have helped others—and could very well help you. Starts on **page 130.**

Watch your language . . .

. . . during a union drive. A little slip of the tongue could let you in for a big tumble. Attorney Paul A. King, an experienced negotiator, cites a case to prove the point. This and other significant labor developments in King's column, Practical Labor Relations, beginning on **page 204.**

What's the gripe behind the gripe . . .

. . . when an employee gives you a hard time? What's really eating him? He probably doesn't know, but chances are you'll be able to find out after you've read "Worker Psychology — a Formula That Works." Here's crew-cut treatment of a long-haired topic—written by a man who's been using his formula to run a profitable plant. Starts on **page 218.**

Do your key men bring you problems . . .

. . . or solutions? Do you let them push you into making *all* the decisions? Those questions mean a lot if you don't want a staff full of weak sisters—and a stomach full of ulcers. So says Lawrence A. Appley, president of American Management Association. His "Passing the Buck Up" is "musn't miss" reading for the plant executive. Begins on **page 262.**

1

OPERATIONS	MIN. PER UNIT	UNIT
SWEEP FLOORS		
Office area, semi-congested	1.4	100 sq.ft.
Production area, semi-congested	1.5	100 sq.ft.
Congested area	2.0	100 sq.ft.
MOP FLOORS		
Damp mop, semi-congested area	1.3	100 sq.ft
Damp mop, congested area	2.0	100 sq.ft.
Wet mop, semi-congested area	2.2	100 sq.ft.
Wet mop, congested area	2.7	100 sq.ft.
Strip mop, semi-congested area	4.0	100 sq.ft.
Strip mop, congested area	6.7	100 sq.ft.
VACUUM FLOORS		
Wood floor	1.8	100 sq.ft.
Rugs	5.0	100 sq.ft.
SCRUB FLOORS		
Once over (2-man team — total)	10.6	100 sq.ft
Twice over (2-man team — total)	18.7	100 sq.ft.
BUFF FLOORS	1.6	100 sq.ft.
WAX FLOORS		
One coat, semi-congested area	1.4	100 sq.ft.
One coat, congested area	2.1	100 sq.ft.
Two coats, semi-congested area	2.5	100 sq.ft
Two coats, congested area	3.8	
WASH [illegible] BLINDS		
Wood blind	50.9	blind
Metal blind	36.7	blind
VACUUM VENETIAN BLIND		
Wood blind	13.8	blind
Metal blind	16.3	blind
DUST VENETIAN BLINDS		
Wood blind	11.7	blind
Metal blind	12.0	blind

STANDARD TIMES are set at Sharp & Dohme for janitorial operations. For a complete list, see note on page 120.

2

STANDARD TIMES • JANITORIAL OPERATIONS

DEPT. Compressing, Coating, Granulating

OPERATION	MIN. PER UNIT
SWEEP FLOORS	
Office area, semi-congested	1.4
Production area, semi-congested	1.5
Congested area	2.0
MOP FLOORS	

NUMBER OF JANITORIAL WORKERS needed to maintain S & D plant at desired cleanliness was worked up on this chart

3

INSTRUCTION CARD

OPERATION: Dust Metal and Wood Venetian Blinds

AREA: All Floors

Get equipment and proceed to work area. Set up ladder and work from top to bottom. Dust top box first; then, handling and dusting each slat individually, do half of blind at a time. Dust both sides of each slat. Move ladder. Repeat same operation on the other half of each blind.

When each blind has been completed, adjust blind (open) about one-third of the way up the window.

PRECAUTIONS: Always use an 8-ft. ladder. This is mandatory. Wherever it is necessary, a scaffold must be used. If ever injury is done to company property, report it to your group leader at once. Never reach farther than arms length; move ladder or scaffold.

EQUIPMENT: 8-ft. ladder, dust cloth, scaffold, feather duster.

TIME ALLOWANCE: Wood blind 11.7 min.
Metal blind 12.0 min.

RETURN THIS CARD TO GROUP LEADER

NON-DAILY INSTRUCTION CARDS describe jobs common to many areas that are performed monthly or semi-annually.

Using Work Measurement to Cut

By T. M. SHEA • Plant Engineer, and
DANIEL GRANATO • Service Supervisor, Sharp & Dohme, Division of Merck & Company, Inc., Philadelphia

GETTING YOUR MONEY'S WORTH out of your janitorial department? This question was bothering us a lot at Sharp & Dohme. So much so that we decided to apply work measurement methods to the costly job of keeping our plant clean. Now we know the answer:

We *weren't* getting our money's worth. Today it's different. **Work measurement has . . .**

. . . **saved better than $24,000 per year** by reducing the number of service workers (our job title for "janitor") from 34 to 30—while increasing the work load by 40,000 square feet

. . . **improved shop housekeeping** by encouraging employees to keep work areas cleaner.

. . . **cut painting costs.** We now repaint every two years instead of every year—because cleaning is preserving surface finish that much longer.

. . . **improved morale** for service workers by distributing work loads evenly; for all employees by providing cleaner workplaces.

The problem

Nobody knew for sure how many service workers we needed. The service workers said more help was needed; we thought the force was adequate.

To get the facts, we appointed a service supervi-

DEPT. NO. _____ FLOOR E-2 5

DATE MEAS. COMPLETED February 27, 1953

WORK UNIT	NO. UNITS	TOTAL STD. (MINS.)	YR. FREQ.	YR. STD (HRS.)
100 sq.ft.	2.9	5	243	20.3
100 sq.ft.	140.6	211	243	855.0
100 sq.ft.	50.6	102	243	414.8

from standard times. Because standard data are used for estimating only, they are rounded off to next highest minute.

INSTRUCTION CARD

4 OPERATION: Daily Office Cleaning AREA: 9th floor, all offices on the Mount Vernon Street side

Obtain mobile trash container. Go through entire area emptying waste baskets, pencil sharpeners, ash trays. Wipe out ash trays with a damp cloth. Wheel trash container to freight elevator. Sweep area thoroughly, under desks, tables, etc.

Vacuum rugs nightly; give special attention under desks.

Damp-dust tile floors after the buffing operation.

Go through entire area each night. Dust desks, cabinets, window sills, partitions, baseboards and chairs. Also dust table in engineering department with a cloth. Dust all equipment on desks, moving when necessary. Wash glass covers on desks with a damp cloth and dry thoroughly. Pay special attention to back slats, legs, and arm rests of chairs when dusting.

PRECAUTIONS: Do not disarrange papers left on desks. Do not spill ink. Do not scar or mar furniture.

EQUIPMENT: Broom, dust cards, dust cloths, dust mop, radiator brush, feather duster.

TIME ALLOWANCE: 8.0 hours.

RETURN THIS CARD TO GROUP LEADER

DAILY INSTRUCTION CARDS describe jobs for specific areas. They help the most inexperienced operator learn quickly.

Housekeeping Costs

sor. He is considered a member of management. Three group leaders (union members), who formerly supervised housekeeping operations, now report to the service supervisor.

Our next step was to set up a plant housekeeping committee, composed of supervisors from production, maintenance, quality control, industrial relations, and industrial engineering. They decided work measurement was the only solution, and outlined a 7-point program.

1. Setting quality standards

Standards were set within a month. Each area of the plant was inspected by the housekeeping committee and rated on a "Seagram's Chart." This chart (developed by the International Sanitation Research Foundation of Louisville, Ky.) provides for the rating of housekeeping conditions on each of six physical elements—floors, equipment, walls, ceilings, windows, and lighting fixtures. Scoring is on the basis of cleanliness, order (housekeeping), and repair and finish (maintenance). (See FACTORY, March 1947, p. 92.)

The committee agreed that the degree of cleanliness in any department should not be allowed to fall below 70 points of the 100 maximum. Frequency of cleaning was set to meet the 70-pt. figure.

2. Improving cleaning methods

In our anxiety to get results faster, we skipped over methods improvement temporarily. Actually it belongs at this point in the program, for our original time standards had to be altered when methods changes were finally made.

The rest of the program had been in effect for about a year when we made a methods study to get further savings. We chose one of the three group leaders to direct this study. Although he had no formal industrial engineering background, his choice seemed logical because:

- He had an excellent knowledge of the work.
- As one of the working group, his suggestions would meet with less resistance.
- He had worked closely with the time study man in developing work measurement standards.

Our aims were to organize the work better, standardize methods of operation, and train the men in improved techniques. We achieved all three of the goals successfully.

3. Setting time standards

Our major concern, of course, was to find how many service workers we really needed and what was a fair day's work for each man. One industrial engineer handled this assignment. It took six weeks of his time, stretched over a period of seven months.

First he made time studies and analyses of every cleaning operation. We found that the major operations of the service department could be divided into 29 types.

In many cases, we had to make several studies of the same operation to obtain data for various operating conditions. For example, we developed separate values for congested and semi-congested floors, and for average and dirty manufacturing operations. Obviously, in many areas cleanliness depends on the process being run.

In the course of seven months we came up with standard data for all operations and conditions. They include a 10% fatigue and personal allowance. Make-ready and put-away time, however, were figured separately.

Turn the page

4. Figuring over-all manpower needs

To determine total manpower requirements, we devised a single 5-page master list. The basic data in this list (operation, minutes per unit, and work unit) are common to all areas in the plant. A tabulation of these data for all operations is shown in Figure 1 (sorry, but you'll have to turn back to page 118 for references to the forms).

The application of the data to any given area requires additional information. Figure 2 shows how we do this for one area. In addition to the basic data (first two columns), we show:

- Number of units to be cleaned in that area.
- Total standard minutes for each item.
- Yearly cleaning frequency.
- Standard hours per year to clean each item.

By adding the last column of yearly hours required and dividing this total by the working hours per year per man, we obtained accurate estimates of manpower requirements.

We then discovered that our work force could be safely reduced from 34 to 30 men. This reduction was accomplished by the normal retirement of older employees.

5. Scheduling the work

Before making the methods study, we divided the daily operations as evenly as possible among our work force. However, daily operations alone did not add up to a full day's work for all the men. Non-daily operations, such as washing windows and cleaning light fixtures, were added to fill out schedules.

After the methods study we adopted a new scheduling plan. The men are in three groups. Two groups are assigned to daily operations. The third is a floating group, which handles non-daily operations and sometimes provides substitutes for absentees in the two other groups.

In practice, the daily schedule is derived from a yearly schedule book based on our frequency data. Each day the supervisor gives each group leader a list of work to be done. The leader uses this list at the end of the day to report work done.

6. Training workers

While the system was being developed, the training department and the service supervisor trained the three group leaders for their added responsibilities. This took two hours each week for four weeks. Training stressed proper handling of men to get the best job and most cooperation, because the group leaders were already experienced in work methods.

The group leaders, in turn, were made responsible for training their men. After this instruction each group leader filled out an instruction report for the service supervisor on each worker's ability and attitude.

After the methods study we had to retrain our men in the more efficient ways. The group leader in charge of methods discussed each man's job with him. Many times the operator and group leader performed the job together to find the best method. They also paid close attention to proper use of the right housekeeping tools.

On completion of retraining we found all operations could be done well within the allowed time without decreasing quality. This called for a revision of time standards.

Just about this time the work load of the department was increased by 40,000 square feet. In the old days this would have meant hiring four additional workers. Our new standards allowed u to take on this added area with the same numb of men.

7. Checking worker performance

Detailed descriptions of methods for cleaning each department and area were typed on a series of 36 instruction cards. A typical card for a non-daily job is shown in Figure 3; a daily job is shown in Figure 4. The three group leaders carry a set of these cards in a pocket-sized notebook. The cards aid them in checking operations being performed, and in training new or substitute workers.

Each card lists the job (one or a combination of basic operations), areas where performed, operational sequence from start to finish, precautions to be observed, tools and equipment needed, and the standard time allowed the whole job. These times include allowances for make-ready and put-away time.

To check performance, we work on the principle that if the quality of the assigned work is good and it is done within the allotted time, our service men are working efficiently. In other words, our group leaders need only check *quality* of scheduled assignments.

To do this, they use the daily report which already served as a preliminary daily-work schedule. It simply shows whether or not each man did his assignment properly within the allotted time. There is space for explanation of reasons for poor work, to be used for corrective action.

As a further check on quality of work, the service supervisor inspects the entire plant twice a night. In addition, every two weeks an inspection team goes through the plant rating each department on the Seagram's Chart. These inspections are not scheduled.

* * *

We'll be glad to send you a complete set of the standard times Sharp & Dohme uses to measure its janitorial operations. Address: The Editor, FACTORY, 330 W. 42nd St., New York 36.

Dime-a-week limit for all hourly employees puts...

New Twist on "Charity Check-Off"

Almost everybody's in for headaches when the time rolls around—maybe a dozen times a year—for charity fund-raising drives in the plant. Cost to the company in lost time and general upset may be more than the amount raised.

Fairchild Aircraft has come up with an unusual—if not unique—solution: A very small, uniform weekly check-off.

By J. H. BAYLIS
Director of Industrial Relations
Fairchild Aircraft Division, Hagerstown, Md.

SOME PEOPLE THOUGHT Fairchild management was being just a bit ridiculous when we announced a voluntary 10¢-a-week check-off program for employee charity contributions. But the results have been excellent:

• **The company has saved hundreds and perhaps thousands of hours of supervisory time** formerly devoted to soliciting employees in individual fund drives. We save the cost of promotional campaigns in support of each of the drives. We avoid the lost production time of solicited employees. And there's no longer any chance of a foreman creating ill-will by "pressuring" employees to contribute.

• **The employees are spared the annoyance of frequent solicitation.** And the uniform, 10¢-a-week contribution for hourly-paid employees eliminates any possible criticism of either "cheap" or "show-off" contributions. Employees on the salaried (semi-monthly) payroll contribute a uniform 50¢ out of each check. The most common employee complaint is that some people want to contribute more. Our answer is simple: By all means do so, but as an individual, from your home.

• **The charities gain because of the broad participation in the plan.** Over 90% of our hourly employees and 97% of our salaried employees have signed up. Although the individual contributions are small, the total contribution by all employees is more than three times what it was with individual drives. And, within the limits of changes in our total employment, each of the charities can count on a definite amount from our employees. Thus there's no chance of embarrassment to a charity (or to the company) from inadequate contributions.

GETTING STARTED • Obviously, it took a big, concentrated campaign to get the program started. But the fact that the weekly contribution was small—and uniform—apparently had an appeal that made our "selling" job easier than we expected.

We don't have any exact figures on the man-hours involved in this campaign—far more costly than the direct expenses—but we're certain it was much less than a year's total for all the separate drives. And it was a one-time effort. There's no need for a repeat performance.

One thing you might find in organizing this type of program is some initial doubts on the part of the accounting and payroll department. Our folks thought it might be a substantial burden. They're now satisfied that administering the mechanics of the check-off is a minor chore, and a small price indeed in relation to over-all company savings.

How to allocate funds among the participating charities posed a real problem. We decided to allocate the fund on the basis of the average percentage of contribution for each drive to the total annual contributions for all drives. (Fortunately we had accurate records over several years.)

That left us only with the problem of those employees who might wish to designate their contributions for specific charities (generally out-of-town workers who did not wish to contribute to local charities). When the employee signs the authorization for payroll deduction—naturally, it's revocable at any time—he is given a card with a list of all the charities. He can designate that his contribution is to go to all, one, or any combination of them.

We audited all the "specials" to be sure that the amounts involved would not require any changes in the percentage allocations. Of course, we keep track of changes (and new employees) to be sure that our historical basis is still an accurate reflection of employees' wishes.

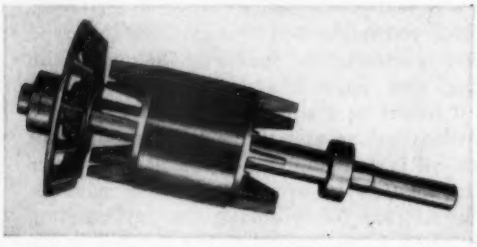
KEEPING IT ROLLING • The employment division of the industrial relations department is responsible for enrolling new people at the time they are placed on the payroll. Participation is 100%.

Besides distributing participation emblems, like the Red Feather, we provide employees with a reminder of their contributions by posting on all bulletin boards notices of all disbursements from the fund to the charities.

KNOW YOUR MOTORS—Which one is the wound rotor?

This?

Or this?



Plant men who know their motors will quickly recognize the common wound rotor at the top, the squirrel-cage rotor in the lower photo. It's equally important for all other plant men to know one from the other—because . . .

One has adjustable speed.

This is the wound rotor. Its conductors are composed of coils placed in the rotor slots in the same way as the stator winding. The rotor coils are interconnected, and leads are brought out to collector rings that rotate with the shaft.

To vary the resistance of the rotor you insert varying amounts of external resistance in the rotor circuit through brushes that ride on the collector rings. And variable rotor resistance in an induction motor means adjustable speed to you.

The other doesn't.

It's the squirrel-cage rotor. It has a fixed resistance. The conductors in this rotor consist of cast bars extending radially through each slot in the laminated core. And the extensions of the bars are permanently fixed to rings at each end to form the complete rotor circuit.

The only way you can *change* the speed of a squirrel-cage motor is by changing the winding connections in the stator. That's what you do with multispeed squirrel-cage motors. These motors have definite steps of speeds, such as 1800 and 900, 1200 and 600 rpm. But there is no variation between these speeds as there is with the wound-rotor motor.

Are You Misusing

By R. F. WOLL, Design Engineer
A-C Motor Engineering Department
Westinghouse Electric Corporation, Buffalo

IT COULD HAPPEN in almost any plant. Tom, the plant superintendent, is on the phone:

"Look, Dick (Dick's the plant engineer), I got a little problem. You know that assembly conveyor over in 18A. I want to use it for a couple of new products."

"Why not?"

"Well, here's what's bothering me. That conveyor was originally planned to run at 35 feet a minute. The two new jobs will call for speeds that run all the way from 25 to 40 feet."

"So, OK, Tom. We yank off the squirrel-cage motor and put on a wound-rotor."

"You mean an adjustable-speed motor?"

"Right."

But how wrong he is! Two things can happen. Either Tom won't get the speeds he wants, or—worse still—the motor will burn out.

So Tom and Dick—and Harry (that's you)—are entitled to know why they call a wound-rotor motor an adjustable-speed motor. And where you should and shouldn't use it. It's like this:

When you have to select a motor for a given task, you have four choices:

- **If the machine to be driven must run at constant speed,** your choice is usually a synchronous motor. It requires a source of direct current for excitation, suitable control, and is relatively expensive.
- **If the machine must run at a wide range of variable speeds,** some form of d-c motor would probably get the job.
- **If the machine speed can fall off slightly with increased loads** without endangering the product or the machine, you can use a simple a-c squirrel-cage induction motor.
- **If you need a machine to run at a limited range of variable speeds**—and particularly where there is no d-c power supply available—you can use the wound-rotor a-c induction motor.

In short, the wound-rotor motor is in much the same position as a man with a famous brother. Its kin, the squirrel-cage motor, has long been a favorite with industry. That's because of its ruggedness, simplicity, low initial cost, long life, and minimum maintenance.

The wound-rotor motor has for many years gone its own way, carving out an application niche based on its unusual characteristics. You simply have to know where you can't use it—and where you can.

Your Wound-Rotor Motors?

Where not to use them

You'll probably get the right motor for the right application when you buy a new motor. The manufacturer's applications engineers will take care of that. But how about the many wound-rotor motors scattered throughout your plant? Many of them will be doing different jobs from those originally intended as a result of changes in processes, design changes in machine tools, and the like. Here are some common ways that wound-rotor motors get misused:

TOO RAPID ACCELERATION · A cable machine used a wound-rotor motor with the speed controlled from a manually operated drum controller. In order to set proper time standards, the industrial engineer wanted automatic speed adjustment. Only difficulty was in duplicating the controller's seven speed points. Automatic controllers of that size cost plenty of money. So a standard 3-point controller was installed.

Result? A burned-out motor. There were not enough speed stops to meet the needs of various sizes of wire.

TOO HEAVY LOADS AT LOW SPEEDS · Another wound-rotor motor was driving a blower, supplying air to a furnace at a variable rate. Changes were made to the intake, which in turn changed the torque-speed characteristics of the load.

Result? A burned-out motor. It had to handle heavier loads on the lower speeds. While it's true that the heating is mostly on the external resistance grids when operating on speed control, the lessened ventilation at lower speeds will cause overheating.

SINGLE-STEP CONTROL · A crane using wound-rotor motors was cab-operated. Then it was converted to floor-operated. The drum controllers had to be replaced with magnetic controls. Since cost was so great, a single-step control was installed after shorting out rotor resistance at the slip rings.

Result? A burned-out motor. Shorting out the external resistance gave the wound-rotor motor the characteristics of a squirrel-cage motor. To take care of the resultant "jolting" at the start of a hoisting operation, the motor was "inched" along. That is, the power was turned off and on rapidly to get the load moving. This works on smaller a-c motors, but not here. The heavy in-rush currents burned out the motor.

VARYING SPEED, CONSTANT TORQUE · Take a conveyor that must be driven at various speeds, depending on the rate of loading or unloading. The varying-speed characteristics of the wound-rotor motor are well suited to this. But the lessened ventilation at the slower speeds will cause overheating if operation at extremely slow speeds lasts too long. Besides that, a very slight change in load will produce a marked change in speed, with consequent danger of unstable operation.

Solution: The slowest operating speed of the motor should not be less than half the synchronous (no-load) speed. And if the speed requirements of the conveyor can be satisfied by up to four definite speeds, then a multi-speed squirrel-cage motor should be used instead of the wound-rotor.

Where to use them

• **For change in speed, for slight change in torque.** Take a cable reel machine, for instance. The reel on which the cable is wound is driven by a suitable constant-speed motor. Consequently the linear speed of the cable increases as the reel fills up. You have to keep the cable under slight tension as it's wound to prevent it from becoming crossed or tangled in the reel. And while the amount of tension doesn't have to be absolutely constant, you do have to maintain a fairly uniform value.

• **For torque at zero speed over a long period.** Locked operation is not desirable for any motor, because of high heat present under locked conditions. But the wound-rotor motor stands up lots better than the squirrel-cage variety. The major portion of the rotor heat is dissipated in the external resistance. You don't produce heat in the motor proper. And the extremely high rotor resistance means minimum heat in the stator for a given locked torque.

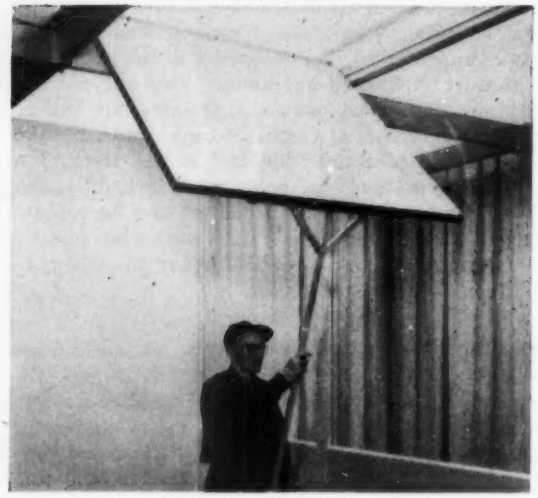
• **For severe-duty applications where the job is too tough for the squirrel-cage motor.** The wound-rotor can often handle the strain of accelerating big loads, and frequent reversing and starting. It's not possible to say in general terms when to use each. Consult the motor manufacturer in each case.

• **Where the power supply is limited, or where heavy starting currents may induce line drops that can cause disturbances in other equipment.** Use the wound-rotor rather than the squirrel-cage motor. It takes less current to start a wound-rotor motor than any induction motor, for a given starting torque.

JOE'S DEPARTMENT

ELECTRICAL IDEAS EVERY PLANT MAN CAN USE

By JOE ST. ANDRE • Electrical Editor, FACTORY



• SWING THAT CEILING

Luminous ceilings are things of beauty. And a joy forever—at least until somebody has to get at the tubes or clean the panels on the inside.

Neither is a problem with the kind of ceiling I saw not so long ago at Thew Shovel. Seems it's made of 5-ft. panels in extruded aluminum frames. One side is hinged. The two opposite corners have touch latches. All the maintenance man has to do is touch these corners to release the latches and let the panel swing down.

I was interested, and asked my Thew friends who made this ceiling. Turned out to be F. W. Wakefield Brass Co., Vermilion, Ohio (which sent me this picture to show you how the swing-down ceiling works).

• DER TAG FOR JOE

I always said the day I saw a motor starter really designed with the maintenance man in mind would be The Day. Now I've seen it—and it was. For instance:

1. Removing the cover exposes all three sides of the starter. Every part of it is right out in the open. All screws are accessible. *That's* progress for you—when you recall that the trend these days has been to make cases smaller and smaller, until it takes a midget with baby fingers to get into the starter to make connections.

2. The overload relays have a heater element that gives you four different motor ratings with only one heater coil. This is done by merely changing the position of the heater coil in relation to the thermal element in the relay. This will cut down on the number of heater elements in your stockroom. It will also enable you to make the necessary adjustments to take care of unusual ambient temperature conditions.

3. The starter has three overload relays instead of the usual two. That means better protection, especially if your power system is grounded.

• WHAT! NO LIGHTS FOR THE DIRECTORS?

One of the largest companies in the South made an important discovery. It had just finished a nice new room for an important meeting of the board of directors. Only one trouble—no lights.

Frantic phone calls finally located enough lighting fixtures in Chicago to do the job. The fixtures were flown down on Saturday. Electricians worked straight through the week end, had lights burning when the directors met Monday a.m.

What of it? Just this: Here we have another case of poor cooperation between various sections of the plant maintenance department. Somebody just assumed somebody else had ordered the lights.

There's a moral: You can't afford to assume anything. You've got to *know*. And that probably goes double in situations touching the board of directors. That is, if you want to stay on the payroll.

• COMING: MOTORS THAT PACK MORE HORSEPOWER IN SAME FRAME

Those NEMA standards I mentioned in June have now been adopted. This means that sometime next year the equipment you buy will have motors with new ratings. The re-rated motors will carry more horsepower in the same size frame.

Take frame size 284, for instance. It's the frame for a motor that's approximately 14 inches in diameter. Today it houses a 7½-hp. motor. Next year—when re-rated motors start coming off manufac-

turers' lines—it'll house a 15-hp. motor. Similarly, the 326 frame, now used for a 15-hp. motor, will hold a 30-hp. job.

PAY-OFF • Motors that pack more horsepower into the same space will meet the rising power demands of improved machine tools. If your horsepower requirements don't change, your motors will use less space—and you'll cut costs on storage, mounting platforms, installation, and maintenance.

WHAT ARE NEMA STANDARDS? As you probably know, NEMA is the National Electrical Manufacturers Association. It's a non-profit trade organization supported by the makers of electrical supplies and apparatus.

NEMA standards define operating characteristics and dimensions of electric motors. They were set up to help you select and mount motors. More important, they standardize design so you can interchange motors made by different manufacturers.

THE NEW STANDARDS cover high-production, a-c motors from 1 to 30 horsepower. Big strides have been made in the art of motor design. What's more, superior new materials are available. Good examples are synthetic insulation and better silicon steels. NEMA's new standards are designed to let motor manufacturers take full advantage of these improvements.

ANY PROBLEMS? You're bound to face a few minor ones as you switch to re-rated motors. For instance:

1. Lots of electricians associate a motor's horsepower with the size of its frame. So, unless they look sharp, they may be confused by the new motors. Fact is the new ratings make things pretty clear. They assign new frame numbers, and add the letter "U" to unchanged numbers.
2. No doubt you keep old motors as spares. When you go to use them on your equipment, you may have trouble fitting them into the spaces designed for the smaller new ones.
3. Motors that are more powerful call for larger shafts—which means bigger bores on pulleys, sheaves, and couplings.

But, all in all, the problems don't amount to much when compared with the advantages.

• KNOW YOUR UNDERGROUND CABLES

In Cleveland, just the other day, a workman was digging up a concrete slab in a steel mill. Fine—up to a point. I mean the drill point in his jackhammer, which struck an underground cable carrying 13,200 volts.

He was lucky. His clothes were burned right off his back. The burns put him in the hospital for a long time. But he lived to tell the story—though not, I hope, to dig up another uncharted cable.

Which leads me to ask: How about the underground distribution system in your plant? Do you know where the cables are located, how deep they are buried, and how much protection is around them?

It's important to know all these things. One of these days you may have to dig up your underground cables. More important, you may have to keep other people from digging them up.

If you're building a new plant, it's easy. Just ask the contractor for proper drawings—and see that you get them. But for plants already built, it's something else again. Try the contractor, of course. Or maybe the field engineer who represented the owners during construction. You might be able to borrow some cable locators from your local power company.

Whatever way you get this information, get it before you get into trouble.

And another thing. It's a good idea to have all orders for excavations routed through your electrical people for clearance. Don't wait till after the damage has been done to call them in. And be sure the electrical department stands by till the underground cable runs are exposed or the digging has been completed.

Sure, it'll cost money to do this. Sure, it'll tie up an electrician. But how much cheaper that is than burning a man or killing him outright!

• IT'S A MOTOR!

A famous comedian once had a collection of things "no bigger than the palm of a man's hand."

If he's still around—and still collecting—he'll want to add a servomotor designed by G-E's Meter & Instrument Department to fit into a standard 2-in. aircraft instrument case.

The photo shows that it is, indeed, "no bigger. . . ." The other thing in the man's palm is a wristwatch—just to give you an idea how small this motor really is.

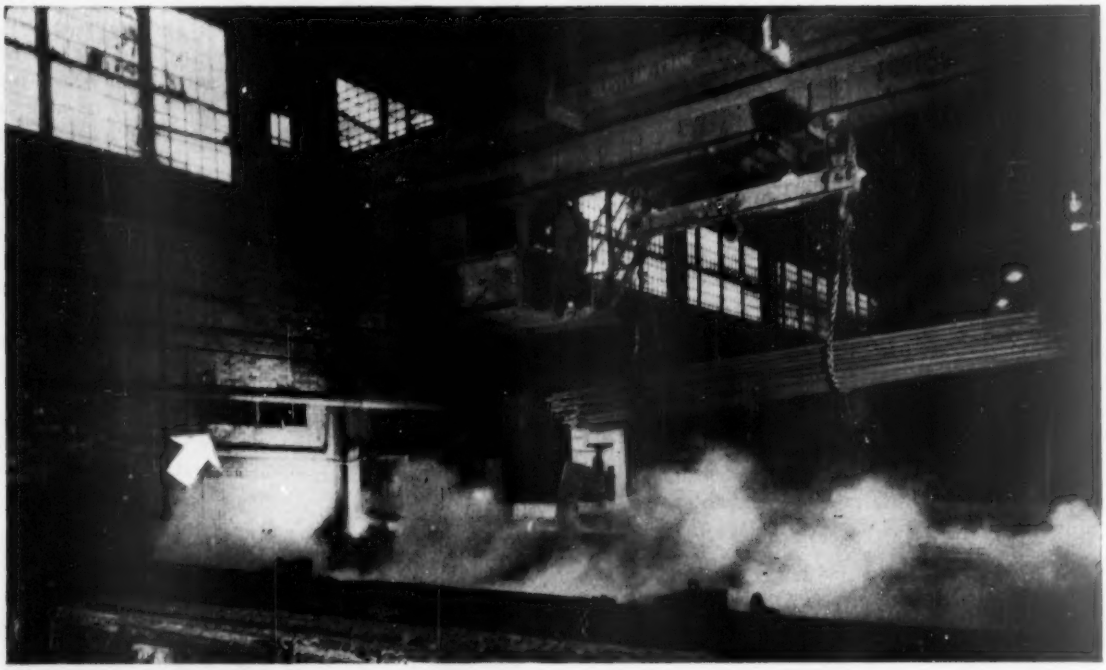
How small is that? One and two-tenths inches long, five-eighths of an inch in diameter! Weight, an ounce and a tenth.

Mind you, I'm talking about a real 2-phase, 400-cycle induction motor with unusually high acceleration, stall torque, and efficiency for its size and type.

P.S. Just thought you ought to know that motors now come this small.

Five ways to use...

Space Heaters for Process Heating



1 · To Reduce Pickling Fog

PROBLEM · Vapor rising from ten 3000-gal. pickling tanks at the Aliquippa (Pa.) Works, Jones & Laughlin Steel Corp., condensed into fog over the tanks, obscuring visibility.

SOLUTION · Four 2-million-Btu.-per-hour gas-fired space heaters were installed outside the building wall near the tanks. They force fresh heated air through diffusers set in the wall above the tanks (arrow). The warm air forms a blanket over the battery of pickling tanks, slows the rate of condensation, and cuts the fog to a minimum.

SPECIAL CONDITIONS · Heating equipment couldn't be installed above the tanks where it would interfere with overhead cranes. And it was undesirable to mount heaters on high roof trusses since only local heating was wanted.

INSTALLATION DETAILS · The heaters are enclosed in individual lean-to sheds along outside building wall. They were converted to burn coke-oven gas by installing sulfur-resistant valves in the fuel lines. Fluctuation in gas pressure necessitated separate combustion blowers for each heater. Heaters function automatically. In summer their circulating blowers ventilate the building and reduce humidity.

2 · To Dry Vitreous Ware

PROBLEM · Old method of providing heat to dry vitreous ware castings and plaster molds at W. A. Case Mfg. Co., Robinson, Ill., was too slow. And air distribution was so poor that employees complained.

SOLUTION · Two heater rooms were built outside the plant and a 1½-million-Btu.-per-hour oil- and gas-fired space heater was placed in each. Warm air is forced through mains and into downcomers. Heat rises from the downcomers through the drying racks. If humidity gets high, roof fans exhaust the air. Faster drying time enabled the company to double output by adding another production shift.

SPECIAL CONDITIONS · Temperature had to be kept between 85 and 90 F. Approximately 700 pounds of water had to be evaporated each hour.

INSTALLATION DETAILS · Heaters have built-in blowers, plus a 40-hp. auxiliary blower on each, to assure proper circulation.

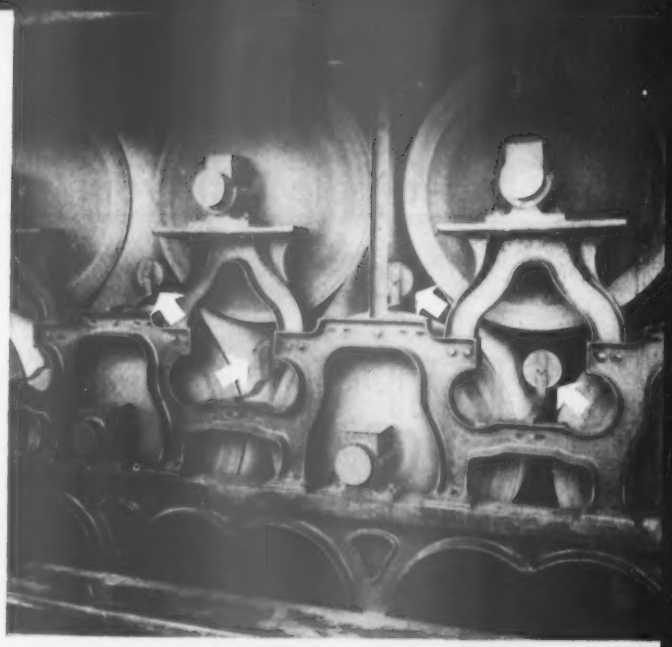
3 · To Cure Rubber Products

PROBLEM · Durham Paper Board Co., Riegelsville, Pa., wanted to boost output of paper from one of its older machines.

SOLUTION · Perforated metal tubes, five inches in diameter, were installed between the steam-heated rolls (arrows). A 1½-million-Btu.-per-hour space heater feeds hot air through the ducts and tubes to the areas between the rolls, helps hasten drying.

SPECIAL CONDITIONS · A positive supply of air at 175 F. was needed. Roof fans would help remove moist air.

INSTALLATION DETAILS · Ducts were designed to supply the heater with either outside air or air recirculated from the base of the machine. To overcome the duct resistance, a booster blower was added. Holes in the 5-in. tubes are spaced one inch apart in parallel rows along three sides.



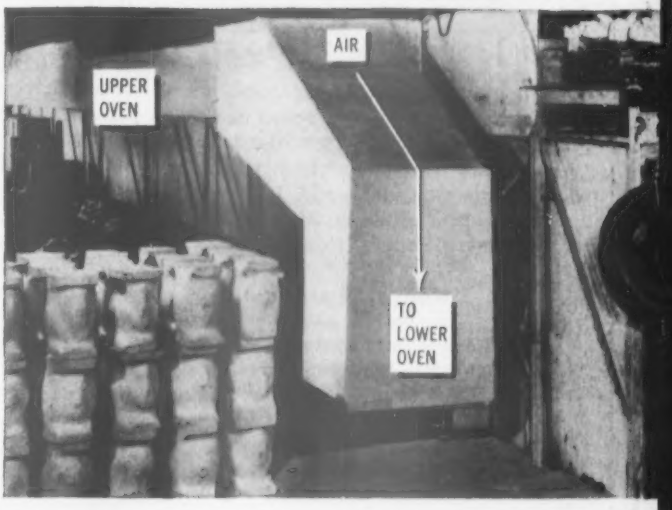
4 · To Boost Paper Production

PROBLEM · To replace old drying oven equipment; to cut costs; to improve quality; to boost drying speed so ovens could keep pace with dipping.

SOLUTION · Bayshore Industries, Inc., Elkton, Md., replaced old units with two new 1-million-Btu.-per-hour space heaters, and cut product cost 66%. Heaters were added to ovens. More heat permitted conveyorizing of latex drying.

SPECIAL CONDITIONS · Latex curing is a 2-stage process—pre-curing at 160 F., final curing at 350 F.

INSTALLATION DETAILS · Ovens are on two floors. Pre-curing is done on the lower floor, final curing on the upper. Air enters upper oven at 350 F. As it cools, it's drawn into lower oven through duct shown. Manually-dampered bypass helps maintain lower oven at 160 F.



5 · To Cure Carpet Backing

PROBLEM · To provide a controllable source of low-cost heat for drying and curing non-slip Neoprene compound on the underside of carpet.

SOLUTION · Devoncraft Corp., Bronx, N. Y., installed a 500,000-Btu.-per-hour gas-fired space heater in a room adjoining the curing room.

SPECIAL CONDITIONS · First, the compound had to be dried, then cured—in the same room, but at different temperatures. The fume-laden air had to be disposed of after each cure.

INSTALLATION DETAILS · For drying, 100% fresh air is warmed and discharged to the curing room. Moisture-laden air is exhausted. During curing, the fresh air damper is closed, temperature rises to 200 F. After curing, heater goes on fresh-air make-up to purge the fumes.

Need help with your problems?

IMPORTANT NEW Free CATALOGS

. . . they're the cream of this month's crop . . .They describe latest methods and equipment. Tell us which ones you want. Use the handy coupon at the bottom of the page. If somebody beat you to it, there's another on page 248.

ELECTRICAL EQUIPMENT

1 Control Centers
Here's a bulletin describing three types of control centers. Tells how to select and plan them. Cutaway illustrations show features of each type. Engineering data and layout diagrams. Bulletin MS 6000. 16-pages. Federal Products Co.

2 Mobile Electrification
A 50-350 amp. custom-designed power system for cranes, monorails, and conveyors is described in this 22-page catalog. Many illustrations and diagrams show how to specify what you need. 22 pages. Insul-8-Corp.

3 Adjustable-Speed Drive
This 12-page booklet tells you about an electronic adjustable-speed drive of from ¾ to 3-hp. Illustrations highlight 11 typical applications. Charts show dimensions and drive characteristics. Specs. Bulletin No. D-2102. Reliance Electric & Engineering Co.

4 Control
Bulletin 5145 illustrates and describes a pilot-operated, pneumatic relay used to add, subtract, and control loading pressures from external sources. Features, operating data, and applications. Dimensioned drawing. 4 pages. Hagan Corp.

5 Electroplating Power Supply
Manually-controlled and automatically - regulated rectifier power supplies for electroplating and similar processes are features of this 16-page bulletin. Describes advantages, applications, operation. Tables list ratings and dimensions. Specs. Bulletin GEC-970. General Electric Co.

6 Variable-Speed Motors
In this 16-page bulletin you'll find construction features, specifications, and cutaway illustrations of horizontal, upright, and combination models. Describes mechanical and remote controls, gives operating data and performance ratings. U. S. Electrical Motors, Inc.

7 Crane Controls
Six basic systems of a-c crane control are featured in Bulletin 3800-20. Selection charts help you choose. Wiring diagrams, operating data, and performance tables. Section on accessories. 20-pages. Westinghouse Electric Corp.

DUPLICATE COUPON ON PAGE 248

MAIL THIS COUPON FOR FREE CATALOGS *(Good until Oct. 31, 1953)*

FACTORY MANAGEMENT & MAINTENANCE (August 1953)
330 W. 42nd St., New York 36

I'm circling the numbers of the catalogs and bulletins I want:

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46						

Name ..... Title .....

Company .....

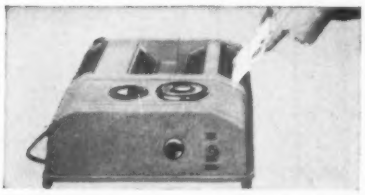
Street Address .....

City ..... Zone..... State.....

OTHER CATALOGS

MATERIALS HANDLING ..... page 242
INSTRUMENTS 244
PIPELINES AND FITTINGS 246
MISCELLANEOUS 248
PLANT ENGINEERING 250
PLANT OPERATING 254

Remington Rand Methods News



With Transcopy, one unit does the whole job – exposes, develops and prints.

Photocopies in Seconds, Made in Your Own Plant

How many dozens – or hundreds – of times have you wished you could have a copy of needed data *immediately*, without waiting for it to be typed or traced or sent to an outside service for photocopying? Now you can have photocopies in seconds, made right on your own premises, of customer orders, bills of material, drawings, etc., by either of these two methods:

One! Transcopy Duplex

A single-unit machine, Transcopy Duplex, does the complete job of exposing, developing and printing photocopies, and does it all in a matter of seconds. No darkroom needed, no running water–you can use it anywhere, move it anywhere. "Installation" is merely a matter of plugging it into any standard electrical outlet. You get perfect, ready-to-use, positive prints up to 14½ inches wide and of any length. And there's no trick to it. Anyone can learn the simple Transcopy Duplex operation in a few minutes and be an expert from there on. Interested? Just mark **(P-344)** on the coupon for free folder.

Two! Portagraph, Transcopy

If you now have a Remington Rand Portagraph or other device for exposing photocopies, there's a second Transcopy model that will team up with it to save time on the total job and eliminate messy, space-wasting developing equipment. Many users have chosen this combination of equipment because Portagraph can copy from opened booklets, pamphlets, etc., making it unnecessary to detach individual sheets. Ask for folder **P-334.**

ATT'N: PURCHASING DEPT.

Thousands of copies of Remington Rand's authoritative, fact-packed manual "Purchasing Procedures" have already been furnished to factory executives responsible for or interested in efficient procurement procedures. Would *you* like a free copy? One or more of the scores of ideas presented may be just what you've been needing to speed up paperwork routines and establish closer control. Ask for **X-1202.**

"Tailor-Made" Production Control With Firm – But Flexible – New Methods

Your production problems may very well be similar, overall or in part, to those of The Rotary Lift Company, Memphis, Tennessee. Some of their products, including hydraulic auto lifts, are reasonably standard. But most of their production consists of devices made to highly individualized customer specifications.

With all the variables encountered in manufacturing complex mechanisms on a one-of-a-kind basis, you might think it would be practically impossible to maintain a firm, effective system of production control . . . one that could assure economical coordination of manpower, machines and materials on every order going through the factory.

Complete, tabulated reports automatically prepared by this Remington Rand machine help the Rotary Lift Company control their production effectively and economically.

A workable system was found, however, in a combination of Remington Rand methods and equipment. Punched cards are utilized for high speed preparation of payrolls, and as a by-product, material and labor distribution. In addition they permit rapid, mechanical tabulation of reports valuable to Production, Purchasing Engineering, Accounting and Management executives. Facts on which to base decisions are now available in a fraction of the time previously required.

Tied right in with the Remington Rand punched-card systems are two Remington Rand visible record systems. One of these uses punched cards as inserts in Sched-U-Graph control boards for visible charting of machine loading. Job assignments and changes in schedule are made quickly, easily, with virtually no possibility of oversight or error.

Kardex, another visible system, provides for convenient recording of information supplied by punched-card Material Requisitions, and maintains an effective perpetual inventory control.

The systems flexibility you need in controlling complex, "tailor-made" production, can certainly be found in adaptations of the punched-card principle, visible record principle, or both, depending on the nature and scope of your factory operations. Remington Rand production control specialists will be glad to make specific suggestions without obligating you in any way, whenever you're ready. But in the meantime, why not read the detailed story on the Rotary Lift Company's complete, coordinated system? Mail the coupon for free copy of **CR 801.**

It's Here! A Completely Descriptive, Low-Priced Bookkeeping Machine

Now, for about one-third the price you'd have had to pay for a "big" descriptive bookkeeping machine, you can have the same, basic time and work-saving advantages. It's a simple machine, easy to operate with its touch-method keyboard, and you can use it for any kind of work–payroll, job costing, inventory, receivables, payables, general ledgers, and many special jobs. It gives you simultaneous posting of all records, complete typewriter description of entries, and complete figurework. You can get five or more totals for posting, distribution and control (up to 140 digits of totals). Ask for demonstration locally or mail coupon for free folder **AB-664.**

PROFIT-BUILDING ***IDEAS*** FOR BUSINESS

Remington Rand INC.

Management Controls Reference Library,
Room 1828 315 Fourth Ave., New York 10

Free literature, please, as marked below:

AB-664 CR-801 P-334
P-344 X-1202

Name_____ Position_____

Company_____

Address_____

City_____ Zone____ State_____

MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

By CARL G. WYDER • Maintenance Editor, FACTORY

▶ This elevated water tank is proof you can . . .

. . . Pay for Fire Protection With Insurance Savings

Before Chicago Bridge & Iron Company installed this 75,000-gal. gravity water tank for Crest Company (Edgefield, S. C.), the fire insurance rate was $25.50 per $1000 plant valuation. Now it's $5.10. A Grinnell system of 600 automatic sprinklers protects 32,000 square feet of floor area against fire.

The savings in premiums will pay for the entire cost of tank and water sprinkler system in seven years. After that, it's clear profit. In short, Crest gets about a 15% return yearly on its investment in an automatic sprinkler system.

Not bad, eh? But Crest realized the return may be even much greater if ever there's a fire. You don't build a new plant in a week. And replacement cost is higher. In suburban locations such as these, statistics say your unsprinklered plant hasn't too good a chance for survival in case of a fire. And the record for unsprinklered city plants isn't much to brag about, either.

Sprinklered buildings have fires, too. But they are usually kept localized and under control, with minor damages.

Faced with facts and figures like these—everything to gain, nothing to lose—you wonder how any plant decides any other way than Crest did. But many plants do. Is yours one of them?

▶ Is Maintenance Too Complicated for Time Study?

We are hearing more and more about the benefits of work measurement in plant maintenance operations. And we hear maintenance executives react in different ways.

Some say, "It's all right for the big guys who can afford time study men to build up time values and standard data. But not for me!" Others "doubt the results justify the effort." A few are convinced, but ask:

"Where do I start?"

That's easy. Start in your janitorial department.

Reasons: Most of the work is repetitive, simple in character, and limited in number of operations. In a matter of weeks a junior time study man can develop your standard times data and show you how to use them. And you don't have to wait long to see results.

You doubt it? Turn back to "Using Work Measurement to Cut Housekeeping Costs," beginning on page 118, and see how Sharpe & Dohme developed standard data for plant cleaning operations.

The results should satisfy even the doubting-est Thomas. In fact, S&D has already done half the job for you.

▶ "Where Can I Get This Tool in a Hurry?"

Judging by the many times we've been asked this question, it's one reason why plant operating men get stomach ulcers.

That's why I think you ought to know about a new, regular service we are giving our readers (page 306). Here FACTORY lists opportunities to purchase used, rebuilt, and surplus new equipment —machine tools, electrical and power equipment, and materials and parts.

Are you facing a "date-project-must-be-ready" deadline, with no possibility of delivery of new equipment in time? Are you trying to keep material costs down on some experimental set-up? Or

NEXT TIME...ORDER SCOTTISSUE TOWELS!

1. They drink up water like an Airedale in August.
2. They're strong — even when soaking wet.
3. They're so soft that many people use them as face cloths.
4. They're clean and white — of course.
5. They're double-fold to dry double-quick.

"EVER PLAY GUESS THE WEIGHT?"

ScotTissue Towels have an exceptionally high fibre content. This "bulk," plus generous size and double fold, makes a case of 3,750 ScotTissue Towels weigh 46 lbs.* Some paper towels cost less for 3,750 but are 10 to 20 lbs. lighter*—hence less drying power. Write for more facts. Dept. E Scott Paper Company, Chester, Pa.

*Shipping weight

SCOTTISSUE **TOWELS**

Symbol of the right kind of washroom

"ScotTissue," Reg. U. S. Pat. Off.

are you looking for some spare equipment for a temporary bulge in activities?

Whatever the reason, the "stock list" in the back pages of FACTORY may be a way to get yourself off the hot seat fast. And it will probably save your company some cold cash on the side.

Watch Out How You Treat Your Conductive Flooring

Purpose of a conductive floor in a plant or hospital, Mr. Adair Baker (technical service director at Vestal, Inc., St. Louis) reminds us, is to prevent static discharges from people or equipment at work on its surface. It should keep "draining" these discharges to a common potential or ground.

Several major problems are involved to insure positive electrical contact between floor and occupants at all times. In the main, people and objects must be properly grounded through metal wheels, plates, clamps, and so on. But after taking all these proper precautions, says Baker, you can spoil everything by improper floor cleaning.

How? For one thing, by using a cleaner that leaves an insulating film of soil on the floor. A single scrubbing action may raise electrical resistance more than 60%. A second mistake is to use an abrasive cleaner that wears away the elements of conductivity.

Obviously, traffic will have the same effect.

So now what do you do? If you protect the conductive floor with thin films of wax, says Baker, you can prevent harmful wear and dirt accumulation. But watch out lest you get too much wax on the floor and build up its resistance beyond safe limits. The important thing to watch is not the number of coats, but the total film thickness.

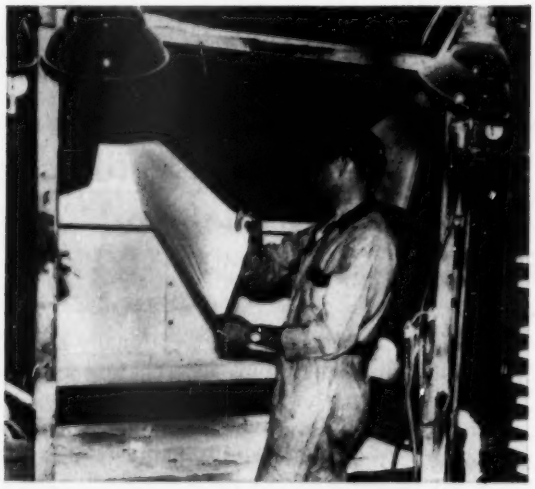
Buffing a floor after waxing helps keep down film thickness. Tests show that you can apply two or three thin coats of wax to a clean floor, if buffed, before you need to strip and rewax. All this presumes you start with a floor of low resistance.

Another way to preserve a safe conductive floor is use of a conductive wax. Because it's usually opaque or black from carbon content, people may object to it. But any removal by excessive wear shows up on a light background, and is a signal of a poor film.

To be safe, says Baker, always test the conductivity of the floor with a conductivity tester before use and after treatment. This is one of the cardinal rules in pamphlet No. 56 issued by the National Board of Fire Underwriters, 85 John Street, New York 7. Written originally for hospitals, this pamphlet will interest any one in an industry where static electricity is a problem.

Turn to page 250 for good ways to solve special plant engineering problems.

IS THIS YOUR MAINTENANCE PROBLEM?



TO SIMPLIFY PAINT-SPRAY BOOTH MAINTENANCE at its Milwaukee plastics plant, Nash-Kelvinator Corp. adopted Vincote coating compound (Dextrex Corp., Detroit). You spray it on, peel it off when you want to remove overspray. Periodic booth cleaning used to cost $50 (two men for a full 8-hour overtime period). Vincote stands up without "dusting," has cut booth cleaning cost to 90 cents per booth per month.

LUBRICATION AND MAINTENANCE OF MOBILE EQUIPMENT have been speeded up at the Bullard Co., Bridgeport, Conn., by using this elevating Lubrilift rack (made by Service Caster & Truck Co., Albion, Mich.). The rack can lift up to 6 tons on a platform that accommodates varying axle widths. It requires no special foundations. Pipe legs support platform at top position, prevent any accidental drop.

NEW SOLNUS OILS GIVE YOU MORE LUBRICATION PER DOLLAR

New Multimillion-Dollar Plant Producing Better General Lubricants at Moderate Prices

They can be used for lubrication of plain bearings, antifriction bearings, linkages, slides, cams and gears; in gear boxes, hydraulic systems, circulating systems, industrial diesel engines, compressors.

They can be used for longer periods because they resist oxidation, prevent rusting and corrosion.

They can be applied by every method used in the general lubrication of industrial machinery.

They have low carbon content In compressors, for instance, any carbon that does form is soft and fluffy, is easily blown off, does not build up.

For technical bulletins, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. F-8.

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

management data sheet 74

Prepared by **ROBERT D. HENDERSON**, Department of Economics, Commerce and Finance, Bucknell University; and **ALEXANDER C. BLAIR**, Department of Economics, Lafayette College

What to Ask an Applicant

HERE'S A COMPLETE LIST of the questions 12 companies ask of employment applicants, for both rank-and-file and management jobs. Even if you don't interview applicants, an interviewer may someday ask you the same questions.

Evaluation pointers for the interviewer are shown with the questions. Complete and summary rating forms are on page 138.

A Suggested Patterned Interview

Date of application ..... Interviewed by .....
Job considered for .....
Name ..... Sex: M ..... F .....
Present address ..... Telephone No. .....
Date, place of birth ..... Soc. Sec. No. .....
Military status .....
Is this desirable at the present time?
Why are you applying to this company? .....
Is he primarily interested in opportunity, money, security, prestige?
How will you get to work? .....
Is this satisfactory?

EDUCATION

Grade school 1 2 3 4 5 6 7 8
High school 1 2 3 4 College 1 2 3 4
Post-graduate college degrees: M.S M.A. Ph.D.
Special training .....
Does he have required background?

High school record

Name of school ..... Place .....
Date graduated ..... Course specialty .....
Will this be helpful?
Scholastic standing: (upper 1/5 2/5 3/5 4/5 5/5)
Best-liked subjects in high school .....
Does position applied for fit?
Least-liked subjects in high school .....
Is position applied for related in any way?
Did you receive any scholastic honors? .....
Indication of ability to learn readily?
What activities did you participate in? .....
Academic ..... Athletic .....
Ability to get along with others?
Social ..... Offices held .....
Indication of leadership?
If you did not graduate, why not? .....
Were his reasons sound?
Principal source of spending money? .....
Desirable?

College record

Note: Same information as high school record, plus type of degree, and how financed in college.

Other schools

Name of school ..... Place .....
Date graduated ..... Course specialty .....
Type of diploma or certificate .....
Will this be helpful?
How financed? .....
Is he self-reliant?
If you did not complete course, why not? .....
Were his reasons sound?

Military training schools

Name of school ....., Place .....
Branch of service .....
Course specialty ..... Diploma, certificate .....
Will this be helpful?

General

What further studying or reading have you done? .....
Is he interested in improving himself?
What other evidences did he give of common sense, reasoning, and learning ability?
Indication of insight, mental maturity?

SOCIAL SITUATION

Single ..... Married ..... Widow(er) ..... Divorced .....
Separated .....
Date of present marriage ..... Children ..... Ages .....
Attitude toward children: what plans for them? .....
Motivation?
What type of people annoy you? .....
Is he biased?
Do you entertain at home? .....
Get along with others?
To what extent? .....
Sensible?

Turn to page 136

When competition gets tough—when buyers compare *quality* as well as price—"Hyatt-equipped" is a recognized guide to top value! That's because business men know that *Hyatt* bearings are *better* bearings—performance-proved to last longer at peak efficiency! And they know also that Hyatt bearings are a reliable indication of *extra quality, longer life,* and *lower maintenance costs* in any product they buy or sell! For cylindrical or spherical roller bearings, HYATT is the name to remember! *"If it's built with Hyatts, it's built to be the best!"*
Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

WHAT TO ASK AN APPLICANT. . . *Begins on page 134*

Attitude toward drinking?.....
Will this interfere with his work?
Have you ever been convicted of violating any law?
.....What for? .....When? .....Where?.....
Does this indicate anything?
What type of recreation do you like most?.....
Does applicant show a mature choice?
What hobbies do you have?.....
Are they related to the job applied for?
Who makes major decisions in the family?.....
Judgment considered good at home?
Do you attend church regularly?.....

FAMILY BACKGROUND

Parents living: Mother?....Father?....Divorced?....
Separated?.....
Has applicant had a normal background?
Father's occupation.....Average earnings.....
What is applicant accustomed to?
Do parents attend church regularly?.....
Active in church work?.....
Indication of religious background?
Did you contribute to the support of family?.....
Early willingness to accept responsibility?
Number of brothers or sisters older?....Younger?....
Was he the baby of the family?
Earliest age partially or wholly financially independent?.....

FINANCIAL BACKGROUND

What is an estimate of your monthly living expenses?
Will salary meet his requirements?
Do you own your home?.....Approx. value.....
How much indebtedness?.....
Stability?
Do you rent?.....
If so, what is your monthly rent?.....
Live with friends?.....Relatives?.....Parents?.....
Motivation for working?
Have own furniture?.....
Do you operate on a budget?.....
Do you have any debts that will not be paid in 30 days?.....
Do you patronize small-loan companies?.....
Judgment?
Do you own real estate?.....
Approximate value?.....
Motivation?
Do you own stocks?.....Bonds?.....
Value of both?.....
Motivation?
Insurance carried: Life $.....Health $.....
Accident $.....
Is family provided for?
Savings on last job?.....If none, why not?.....
In relationship with earnings?
Do you have a savings account?....Other income?....
Is wife employed?.....
If yes, nature of work?.....Salary?.....
Will this effect his motivation?

WORK RECORD

If not employed during last 30 days, how did you spend your time?.....
How did you support yourself?.....
Did he spend his time profitably? Is he dependent on others?

Present or last position:

Name of company.....Address.....
Nature of business.....Period of service.....
Does this check with application?
First position?.....Starting salary?.....
Does his experience fit?
Final position?.....Leaving salary?.....
Does his experience fit? Were promotions obtained? Merit or automatic?
Features liked about work?.....
Was he content with these duties?
Features disliked?.....
Does job applied for have similar characteristics?
Reasons for leaving?.....
Is he chronically dissatisfied? Are reasons sound?
Were you discharged?.....If yes, Why?.....
Emotional reaction to failure?

Prior position and second from last position:

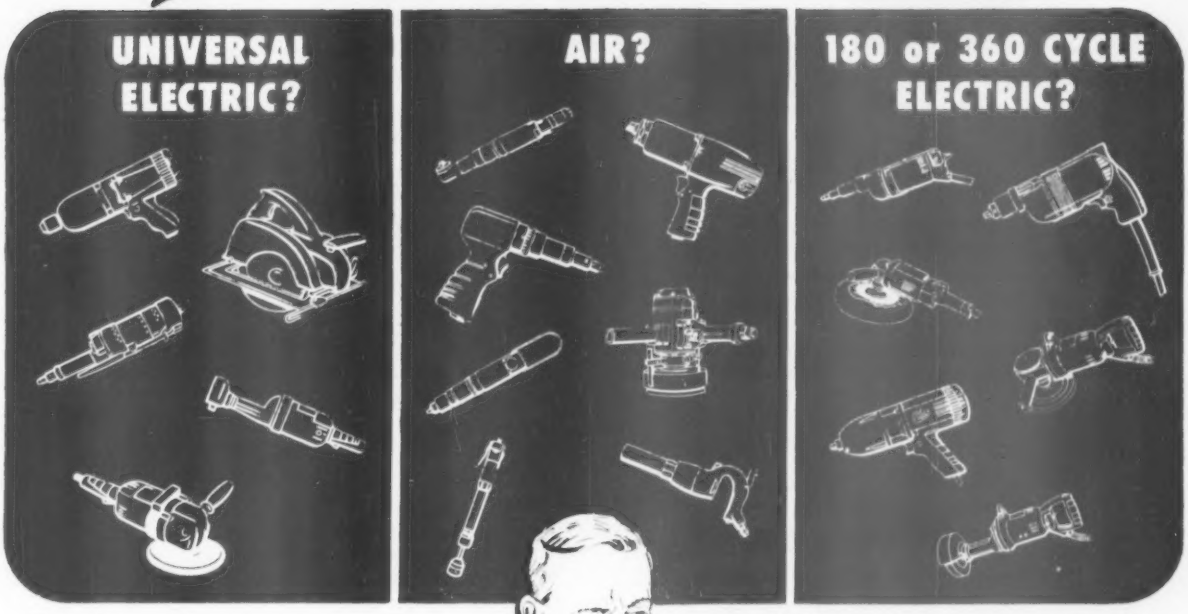
Same information as "present or last position."

Other jobs held:

Name of company.....Period of service.....
Type of work.....Reason for leaving.....
Has he continually improved himself?
Has he changed jobs often? Has he stayed in one field? Is work record satisfactory? What type of work has he been most interested in?
Total unemployment since leaving school?.....
What traits does this indicate?
How was time spent while unemployed?.....
Was time spent profitably?
What was your attitude toward unemployment?.....
Did he seem concerned?
What accidents have you had in recent years?.....
Accident-proneness?

Turn to page 138

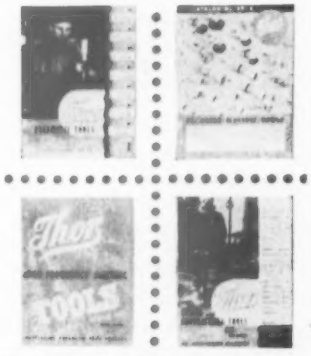
Thor HAS THE ANSWERS!



Produce More at Lower Cost With Portable Power Tools

60 years in the business, with over 1,500 different types of power tools available, *THOR POWER TOOL COMPANY* is well qualified to give you sound, impartial advice on *ALL* portable power tool problems. *Thor—and* only *Thor—specializes exclusively in the manufacture of portable power tools . . . of ALL types.*

For money-saving, cost-cutting *IDEAS*, write for Thor Power Tool Catalogs or a "get acquainted" call from a Thor service engineer. Thor Power Tool Company, Aurora, Ill. *Sales and Service Offices in Principal Cities.*



YOUR FILES ARE INCOMPLETE if you do not have the latest Thor Tool catalogs covering Thor Air Tools, Thor Universal Electric Tools, Thor 180 Cycle and 360 Cycle High Frequency Electric Tools. Use coupon below.

Thor TOOLS

UNIVERSAL ELECTRIC	Augers, Backfill Tampers, Balancers, Belt Sanders, Bench Grinders, Chisels, Chipping Hammers, Clay Diggers, Core Busters, Couplings, Feed Mechanisms, Fender Hammers, Files, Grinders, Hammers, Hoists, Impact Wrenches, Lubricators, Nail Drivers, Nut Setters, Paving Breakers, Pin Drivers, Polishers, Pumps, Rammers, Reamers, Rivet Busters, Rivet Squeezers, Rock Drills, Sanders, Saws, Scaling Hammers, Screwdrivers, Sheet Metal Nibblers, Spike Drivers, Tappers, Valve Refacers, Valve Seat Grinders, Wire Brush Machines, Wood Borers
AIR	
HIGH FREQUENCY ELECTRIC	

THOR POWER TOOL COMPANY
Aurora, Illinois

Please send catalog covering Thor
- ☐ Air Tools ☐ Universal Electric Tools
- ☐ 180 Cycle High Frequency Electric Tools
- ☐ 360 Cycle High Frequency Electric Tools
- ☐ Please have your service engineer call

Your Name_____

Company_____

Street_____

City & State_____

WHAT TO ASK AN APPLICANT. . . *Begins on page 134*

HEALTH

What is applicant's health background?
Is he able to do the job?
What was the applicant's health as a child?
What effect on mental and physical growth? Personality?
Time lost during last five years because of illness?
Is sickness a regular occurrence?
Physical defects?
Effect on job applied for?
Wife's health? Children's health
Emotional strain?

Complete Rating Scale

Directions: Use rating grades 1, 2, 3, and 4 to indicate, respectively, *below average, average, above average,* and *exceptional.* Consider each factor individually; write the number that best describes the applicant. Then determine an average rating for each division.

Applicant Position
Interviewed by Date

Education and Training **Division aver.**
Sufficient for job (too little, too much)
Best-liked, least-liked subjects related to the job
Level of school grades Reasons for leaving
Special training

Work History **Division aver.**
Number of previous positions
Previous employment check
Similar working conditions
Likes or dislikes related to the position
Level of earnings
Reasons for applying for the position
Has improvement been shown from positition to position
Reasons for leaving previous positions
Does history indicate stability and industry

Intelligence **Division aver.**
Common sense Judgment
Well-informed Mental alertness
Scholastic standing

Personality **Division aver.**
General appearance
Does he express himself adequately?
Poise Disposition
Did applicant appear nervous, high-strung?
Did applicant appear aggressive, self-confident?
Manners Level of aspiration
Enthusiasm
Initiative in conversation
Health Emotional stability

Social-Financial-Personal **Division aver.**
Early environment Marital status
Religious background
Cultural background
Ability to get along with others
Did applicant appear to be honest, trustworthy, sincere?
Motivation to work
Early experience in responsibility
Emotional factors related to home
Other sources of income

Leadership Qualities **Division aver.**
Ambition Initiative
Promotional possibilities
Attitude toward responsibility

Interviewer's comment on any other important favorable or unfavorable information such as family life, financial situation, salary consideration, etc.

Summary Rating Form

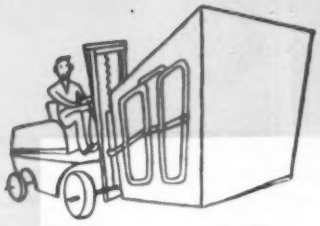
Directions: Check only the facts which are evident from the application blank and interview. Use a check to indicate the factor is favorable; a double check to indicate unfavorable.

Applicant Position
Interviewed by Date
Age
Too young—too old?
General appearance
Desirable—undesirable?
Education and training
Does this meet the requirements?
Previous job experience
Is he qualified?
Health and physical handicaps
Can he do the job? Pass physical examination?
Motivation
Marital status? Dependents? Indication of willingness to work?
Attitude and manners
Chip on the shoulder? Friendly? Courteous?
Would you recommend further consideration?

Have You Explored All the Ways To Save Money With a Fork Truck?

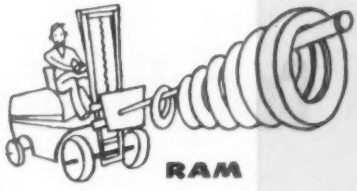
WOULDN'T IT BE GOOD BUSINESS to know all the ways to save money with your Clark truck? It's the function of Clark attachments to transform your truck into a machine of *many* uses. Rather than let a truck stand idle for "lack of work," you can switch from one attachment to another in 10-20 minutes—go from one job to another, from partial idleness to *full-time* usefulness.

For example, why use manual labor to handle scrap, coal, sand or even cement? You'll do the job faster, more economically with one of Clark's shovel attachments. Why manhandle cartons, crates, rolls, drums, bales? Simply switch to the proper Clark attachment—there's one designed to handle practically any product or material. And for the relatively few cases where a standard attachment won't do the job, it's more than likely that our Custom Truck Department can design and build special equipment to solve the problem (—and inquiries are invited).



CARTON CLAMP

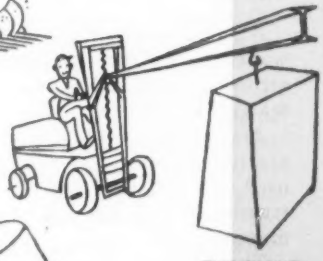
Perhaps you're hesitating to buy a fork truck because your principal handling job requires only part-time truck application. If that's the case, don't fail to look into this attachments angle. Chances are we've got, or can devise, one or more attachments that will enable you to utilize a fork truck profitably, all day long.



RAM

SHOVEL

Your local Clark dealer (listed in the Yellow Pages of your phone book) will be glad to help you plan ways to multiply the usefulness of your Clark trucks and POWRWORKER hand trucks. Or if you prefer to use the coupon, we'll gladly send a brochure describing the Clark line of attachments.



CRANE

ROTATING ROLL CLAMP

1903 CLARK EQUIPMENT

CLARK ELECTRIC, GAS, DIESEL, L.P. GAS **FORK TRUCKS**

AND POWERED HAND TRUCKS - INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 12, MICHIGAN

Please send: ☐ Attachments Catalog ☐ Driver Training Movie
☐ Have representative call

Name _____

Firm Name _____

Street _____

City _____ Zone _____ State _____

WHAT'S NEW IN EQUIPMENT

. . . BRIEFED HERE FOR THE CONVENIENCE OF PLANT OPERATING MEN IS INDUSTRIAL PLANT EQUIPMENT NOW ON THE MARKET . . .

AIR HANDLING 142
AUXILIARY EQUIPMENT 144
ELECTRICAL EQUIPMENT 150
MAINTENANCE TOOLS & SUPPLIES . 160
MATERIALS HANDLING 170
MEASURING & CONTROL 180
PLANT HOUSEKEEPING 184
SAFETY & PLANT PROTECTION . . . 190
VALVES & FITTINGS 192
MISCELLANEOUS 198

IN THE NEXT ISSUE . . . Some notes on important late items. More about them next month.

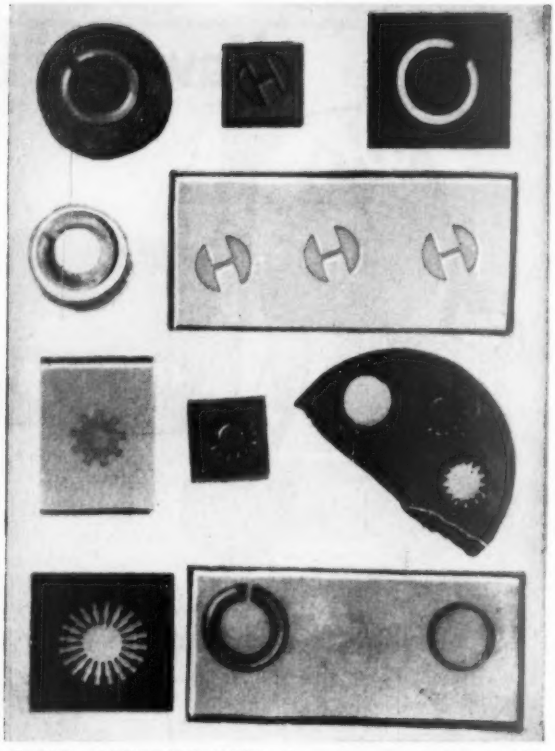
Two-way voice communications system for linking a base station with mobile equipment such as cranes.
Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8.

Resistance-welding control permits fast, high-quality welding of hard-to-weld metals such as aluminum, magnesium, and non-ferrous alloys.
General Electric Co., Schenectady 5, N. Y.

Vibrating solids feeder will feed materials up 5-deg. slope. Machine's output can be varied from 0.1 to 20 cubic feet per minute.
Richardson Scale Co., Clifton, N. J.

Latex base paint formulated for the needs of the maintenance engineer combines economy, speed, and single-coat application.
The Glidden Co., Cleveland.

Packaged water conditioners engineered for efficiency and simplicity. Made in eight standard sizes ranging from 500 to 3300 gallons per minute.
Permutit Co., 330 W. 42nd St., New York 36.



CLEAN, ACCURATE CUTS of varying complexity can be made in metal, glass, and ceramics by ultrasonic tool.

Complex Cuts Easy

Raytheon Manufacturing Co.'s new sonic energy machine tool will carve fancy shapes or plain with extreme accuracy.

A new machine tool—driven by ultrasonic sound waves and vibrating approximately 2700 times per second—carves plain or complex designs in hard materials with great accuracy.

Actual tolerances of the work being performed are limited only by the accuracy of the die being used or the dimensions of the shaped tool, and the trueness of the ways and feed of the machine, the manufacturer says.

The tool, can be made of relatively soft materials, such as cold-rolled steel or brass. Yet it effectively cuts complex shapes or drills ordinary holes in hard steel, glass, ceramics, or even precious stones. The pieces worked on need not be made of conductive materials.

The motion of the tool—only a few thousandths of an inch each way—is invisible. But its great velocity is the key to its efficiency. This slight

CUTTING TOOL vibrating at ultrasonic speed forces abrasive particles to cut material being worked.

SET-UP IS READY for action. While operation is in progress, abrasive liquid flows continuously over the work

for Ultrasonic Tool

movement is present even when the tool drills a round hole

For operation, the work is clamped firmly in place and the tool is lowered until it contacts the surface. A liquid abrasive flows over the piece to be machined, then the power is turned on

The abrasive particles in the continuously flowing liquid are driven by the tool with ultrasonic speed The acceleration causes the particles to hit the work with a force of 5000 to 10,000 times their normal weight. This action cuts away the material.

On very hard surfaces, each transverse of the tool cuts into the work an immeasurable distance —perhaps only the depth of a few atoms Yet the tremendous repetitive rate enables the tool to cut rapidly.

In its present form the machine resembles a conventional drill press However, other models are now being designed to perform the functions of a lathe, milling machine, boring mill, shaper, saw, planer, and router.

Raytheon Manufacturing Co., Waltham 54, Mass

EQUIPMENT for the operation includes drillpress-like machine, a sonic energy generator, and an abrasive pump.

GET THIS DESCRIPTIVE CATALOG ON THE
COST-CUTTING, PRODUCTION-BOOSTING

WORK-O-MATIC* SYSTEM

Users report production increases from 22.6 to 52.8%

Likewise, in a typical scrap handling operation, the cost of loading a carload of scrap was reduced from $138.55 to $6.83. *Ask for Catalog No. 83.* Write to The Union Metal Manufacturing Co., Canton 5, Ohio.

*Patent No. 2,445,038. Other patents pending.

UNION METAL
Material Handling Equipment

RUSH CATALOG 83

FOR YOUR CONVENIENCE

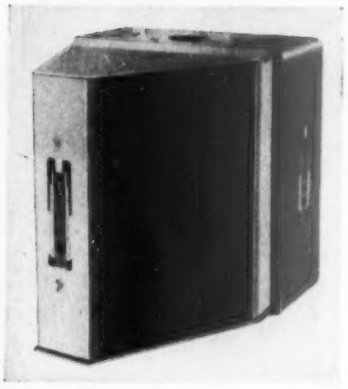
*YOUR NAME*_____

*COMPANY NAME*_____

*ADDRESS*_____

*CITY*_____ *STATE*_____

AIR HANDLING



Cuts Cleaning of Unit Heaters

Clean-Core is a die-formed filter frame with a standard cleanable type air filter. Can be installed on existing unit heaters in hot water and steam heating systems.

Manufactured in 11 sizes. Especially useful in locations where dust, oil mist, and other foreign matter are present in the air. Fastens to the top and bottom of the unit heater casing.

Young Radiator Co., Racine, Wis.

■

Corrosion-Resistant Exhaust Ventilators

Made of Agilide, unplasticized polyvinyl chloride, which has good chemical resistance to most corrosive vapors.

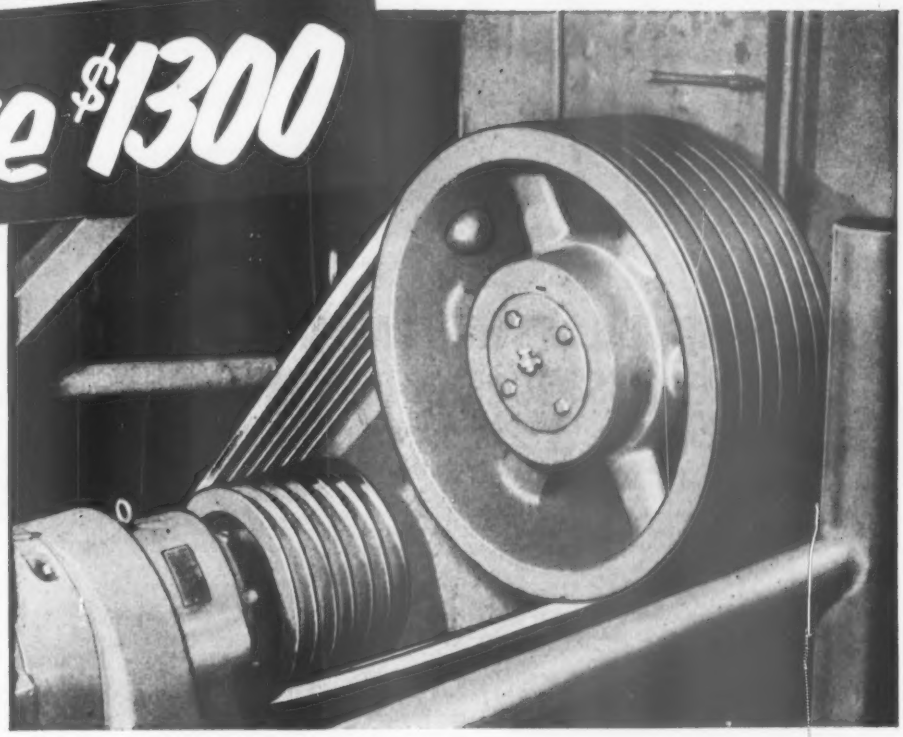
Units have motor mounted on a steel ventilator and motor base. Can be used with new or existing ventilation systems.

Available in four sizes, ranging from 250 to 1670 cfm.

American Agile Corp., P. O. Box 168, Bedford, Ohio.

Turn the page

See how V-Belt *Preventive Maintenance* can Save $1300



What is the *real* cost of replacing a set of V-Belts on a machine? Often it is far more than just the cost of belts.

For example: A dye works operates this heavy-duty calender which processes 500 feet of cloth per minute. The drive has 6 belts. Here's the cost when the calender is shut down for a belt change:

Cost of new belts	$ 120.00
Cost of labor	2.00
Cost of lost production during down time	1300.00
Total cost of belt change	$1422.00

Dayton V-Belt Survey Experts often can extend the time period between belt changes by 50 per cent—through installing Dayton V-Belts. In this textile plant, for instance, it would be possible to extend the time between changes from 5 to 7½ years. This, in itself, is a worthwhile saving. *But the real pay off comes from the elimination of costly down time through Dayton's Preventive Maintenance Program.*

You too can make BIG savings with Dayton V-Belts and Preventive Maintenance. Call your Dayton Jobber for further details. He's listed under "Belting" in your local telephone directory.

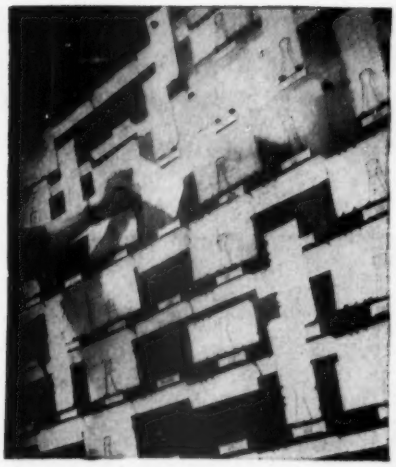
DAYTON RUBBER COMPANY • DAYTON 1, OHIO

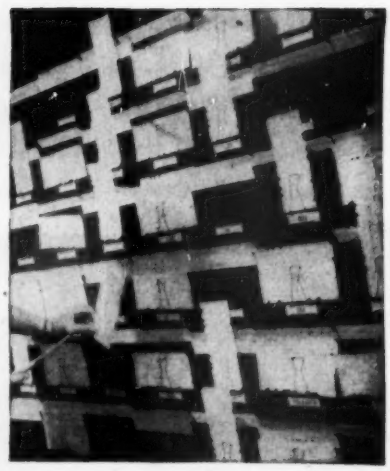
Dayton Rubber

Since 1905

WORLD'S LARGEST MANUFACTURER OF V-BELTS

© D.R. 1953





One movement of Job Time Ticket on these McCaskey Boards directs dispatcher, move-men, set-up men and operators according to production plan . . . with

NO ASSEMBLY DELAYS FROM MISSING PARTS NO EXCESS WORK IN PROCESS

Barcalo Manufacturing Company, Buffalo, N.Y. has met the problems of dispatching production of a widely diversified line of products . . . from hand tools and metal furniture to pillows and mattresses . . . with McCaskey Machine Loading, Scheduling and Job Assignment.

Shop orders formerly were handled in a "blind file" and one or more parts often were overlooked or delayed with serious results. This is totally eliminated by the use of McCaskey Machine Control Boards and the following procedure developed by W. J. Navelle, Production Control Manager:

1. Job time tickets are pre-written without operators' clock numbers (see paragraph 7) and assigned to machines by Production Control Department.
2. They are placed by dispatcher in rear pockets of McCaskey Machine Control units in sequence specified by Production Control. Load is recorded on load cards.
3. Foreman selects jobs to be run next and moves tickets to front pockets of control units.
4. Dispatcher issues stores requisition for material, attaches to and notes action on job ticket.
5. Material move-man takes requisition to stores, delivers material to or near machine and marks ticket when move is complete.
6. Set-up man checks board, draws tools and dies and marks ticket when job is ready to run.
7. Job is assigned to operator by dispatcher; his number is written and starting time is stamped on ticket. Ticket then is visibly filed under clip spring at front of control unit.
8. When job is finished, dispatcher rings out ticket, enters production summary on permanent record and sends ticket to Production Control.
9. Production Control completes its record and sends ticket to Payroll Department.

Foreman, by quickly referring to McCaskey Board, selecting jobs to be run and moving job tickets thus provides instructions for (1) dispatcher, (2) move-men, (3) set-up men and (4) operators. Jobs are run and essential operations performed according to Production Control's Plan. This McCaskey installation once again demonstrates how readily duplicated effort, delays and confusion are replaced by economical, planned production.

Let us talk with you about a McCaskey procedure for your department or plant. Equally adaptable to line or job shop production, assembly, maintenance or individual job assignment. Mail coupon today for complete information.

McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me bulletins describing McCaskey Machine Loading, Scheduling, Dispatching and Job Assignment.

Name .....

Position .....

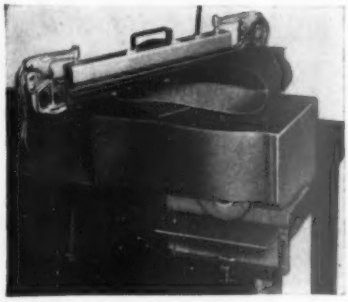
Company .....

Address FMM-8-53

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY
TOOLS • COSTS • PAYROLL
THE McCASKEY REGISTER CO.
ALLIANCE, OHIO
McCaskey Systems, Ltd., Galt, Canada
The McCaskey Register Co., Watford, England

Begins on page 140

AUXILIARY EQUIPMENT



Improved Splicer for Abrasive Belts

Splicer designed to reduce splicing time, increase splice quality, and save bench space has many improvements over previous models, the maker claims.

It includes a self-contained cutting guide and press holder mounted on enclosure protecting motor, V-belt, and grinding wheel.

Thermostatically controlled electrical element cures joints.

Aget-Detroit Co., 605 Main St., Ann Arbor, Mich.

■

Air Pressure Regulator With Pilot Control

Pressure regulator and control are separate to provide greater flexibility and efficiency. Regulator can be placed in most efficient location while separate control is installed where it is most convenient.

Light adjusting spring makes regulation easy and precise, the manufacturer claims.

Operating range from 2 to 120 psi., with capacity to deliver more than 200 cfm. Available in ½-, ¾- and 1-in. sizes.

C. A. Norgren Co., 3421 S. Elati St., Englewood, Colo.

Turn the page

SUIT YOURSELF in Wool, Cotton or Synthetic

ALLIS-CHALMERS MOTORS serve every major industry. Sizes from 1 hp up—standard and special types to meet specific production requirements.

←This Will Help You Get a Good "Buy"

CLOTHING wouldn't be as good and it would cost a lot more, if it weren't for the modern machines that make textiles.

This Allis-Chalmers *Quick-Clean* motor was specially designed for textile mills. Because it *blows itself clean*, it doesn't clog with lint and overheat . . . keeps production rolling, requires no shutdowns for cleaning. Thousands of these motors, together with *Texrope* V-belt drives, drive intricate textile machinery in many of the most famous mills in America.

Like all Allis-Chalmers electric power products (turbines, transformers, switchgear, controls), these motors make jobs more productive and help create better standards of living for everyone.

Quick-Clean and *Texrope* are Allis-Chalmers Trademarks.

Machinery and Equipment to Help People Produce More, Have More—*LIVE BETTER!*

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

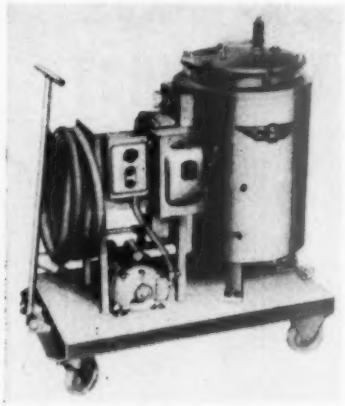
GENERAL MACHINERY DIVISION

PLANTS IN: MILWAUKEE, WIS.—PITTSBURGH, PA.—NORWOOD, OHIO—BOSTON, MASS.—TERRE HAUTE, IND.—MONTREAL, P. Q.—ST. THOMAS, ONT.

..from sea to
shining sea"
America is the land of plenty. Industry
has made it so. In America's great industries—
wherever leakproof hose connections are required
—Punch-Lok hose clamps can be found making their contribution to America's growth. Only Punch-Lok does
so many jobs . . . so well!
See your near-by Punch-Lok Distributor
"The Sign of a Good Hose Clamp"
Punch-Lok COMPANY
921 North Justine Street • Chicago 7, Illinois

NEW AUXILIARY EQUIPMENT

Begins on page 144



Portable Oil Filter

Here's a portable cartridge filter that can be used wherever oils need cleaning. Operates on a recirculation basis until oil is fully reconditioned. Flexible hose with quick-connecting couplings permits machine hook-up without interrupting operations, the maker claims. Can be moved quickly and easily.

Comes in 30- and 60-gph. pump capacities.

U. S. Hoffman Machinery Corp., 219 Lamson St., Syracuse 6.

■

Pneumatic Tool Line Oiler and Filter

Here's a lightweight lubricator to supply your pneumatic tools with "oiled air" and at the same time filter the line. Any oil up to SAE 30 can be used.

The oiler-filter has no moving parts. Oil flow is regulated by a simple needlepoint adjustment.

Filter section is cleaned by removing a plug, turning on air, and blowing out waste particles.

Air-Speed Tool Co., 1502 W. Slauson Ave., Los Angeles 47.

Turn the page

EASIER TO INSTALL AND MAINTAIN!

mount 1 device instead of 2

extra-wide gutters

all components accessible from front

plenty of knockouts

SQUARE D COMBINATION STARTERS

(Switch or Circuit Breaker Types)

Save space and time. Mount and wire one device instead of two . . . neater, more attractive installations.

Write for Bulletins 8538 and 8539
Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

Why SKLEEN?
Over 10,000 different brands of cleaners are manufactured today. All 10,000 will clean floors —but with varying degrees of cleanliness. A full year of investigation revealed the shortcomings of most of these cleaners...showed a definite need for a floor cleaner that would:
1 THOROUGHLY CLEAN
2 BE GENTLE & NON-INJURIOUS TO ALL SURFACES
3 RINSE FREELY, LEAVING NO FILM OR SCUM
4 BE ECONOMICAL
The Result Was SKLEEN
LIQUID DETERGENT FLOOR CLEANER
The synthetic cleaner that is scientifically formulated to clean floors fast, thoroughly, gently . . . and economically.
Vestal
INCORPORATED
4963 MANCHESTER AVE.
ST. LOUIS 10, MO.
VESTAL, INC., 4963 Manchester, St. Louis 10, Mo. Dept. F
Have your Vestal representative demonstrate SKLEEN for me.
Send a free copy of report containing results of scientific tests on SKLEEN'S performance.
NAME
ADDRESS
CITY
STATE

NEW AUXILIARY EQUIPMENT

Begins on page 144

Packaged System for Boiler Conversion

A factory-coordinated industrial fuel burning system makes possible for the first time a packaged system for the conversion of large boilers to oil or gas firing, the maker says.

The system is built around a Tork-Power burner for oil or gas firing. It includes panel-mounted controls wired for easy connection, windbox assembly, refractory ring for quick installation, fuel oil heaters, and trim.

York-Shipley, Inc., York, Pa.

■

Blow Gun Meters Air Pressure

Throttle valve lets operator regulate the flow of air at any desired rate.

This finger-tip control is designed to make the blow gun adaptable to many shop uses. Valve can also be set for fixed pressures.

Aro Equipment Corp., Bryan, Ohio.

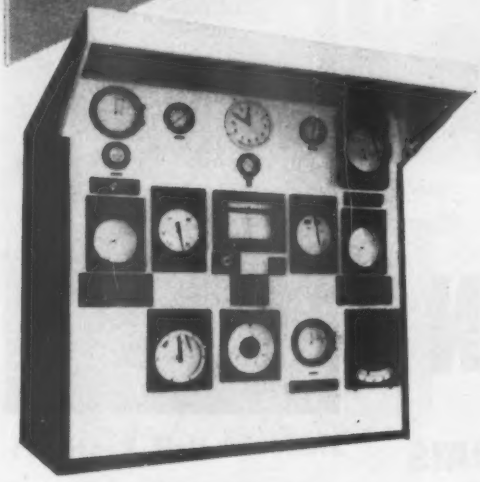
■

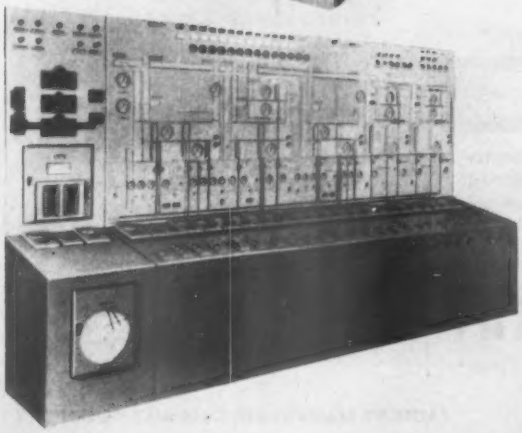
FRACTIONAL HORSEPOWER VARI-DRIVE MOTORS in combination with right-angle Syncrogears have been designed by U. S. Electrical Motors, Inc., Box 2058, Terminal Annex, Los Angeles. Especially for applications requiring low, variable speeds with a right-angle hook-up. Come in ¼, 1/3, ½ and ¾ hp. with speed variations up to 10:1.

■

ADJUSTABLE TORQUE-LIMITING CLUTCHES to provide overload protection for machine drives have been announced by the Morse Chain Co., 7601 Central Ave., Detroit 10. These slip-type friction clutches act as automatic shear pin mechanisms, thus eliminating the need to insert new shear pins.

Turn the page





Give your process efficient centralized control *with*

Honeywell Panels

THE CONTROL centers of your plant can contribute important improvements in operating efficiency, ease of supervision, labor savings. To achieve the full potential benefits of this modern control concept, it will pay you to specify Honeywell custom-engineered panels. The choice of leading manufacturing and consulting firms, Honeywell panels are made in a wide variety of types . . . a few of which are shown here.

Every Honeywell panel is custom-designed for its individual application, by specialists who are thoroughly experienced in all phases of industrial process control. However simple or complex your process requirements may be, Honeywell engineers can work out an efficient panel design. They combine attractive appearance with functional arrangement of all components—to produce a layout that affords maximum convenience, minimum fatigue, simple manipulation and easier training for operators.

Your Honeywell panel reaches your plant in whatever form best suits your needs. It can be completely preassembled and shipped with all instruments, controls and accessories fully wired, piped and tested. Or, if you prefer, panels and instruments can be shipped separately and then assembled at the site by qualified Honeywell installers, or by your own mechanics . . . if you like, under our supervision.

Your nearby Honeywell sales engineer will welcome the opportunity to discuss centralized instrumentation for your plant . . . and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4461 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

H
HONEYWELL

Cincinnati

THE TAFT MUSEUM
now a famous Cincinnati landmark was once the residence of Mr. and Mrs. Charles Phelps Taft. Built in 1820 when architecture was influenced by classic forms, this historic house merits the visitor's attention for its charm and authenticity.

HOME OF
ALVEY-FERGUSON
the original-Since 1901
engineered conveying systems

YOU CAN SEE THE SUPERIORITY OF A-F CONVEYOR ENGINEERING

Cincinnati is famous for many types of products — among which are A-F Engineered Completely Co-ordinated Conveying Systems.

A-F Alvey-Ferguson Engineers All Types of Conveying Systems For All Types of Industry

For a discussion of latest scientific handling methods write

THE ALVEY-FERGUSON COMPANY
A-F
138 Disney St., Cincinnati 9, Ohio—Offices in Principal Cities

WHAT'S NEW IN EQUIPMENT
Begins on page 140

ELECTRICAL EQUIPMENT

Standard Unit Rectifiers

These unit rectifiers eliminate the wait required to obtain custom-built units, maker says.

Designed to convert a-c to d-c at the flick of a switch. Stock sizes range from 3 to 50 kw., 125- or 230-volt d-c output, with either fixed or variable voltage.

Manufacturer claims all units are tested with a 200% overload.

American Rectifier Corp., 95 Lafayette St., New York.

For Hard-to-Start Fluorescent Lamps

New line of fluorescent lamp starters designed for hard-to-start conditions involving such things as high humidity and low line voltage.

The starters are called Jackrabbit. They are available in all types and sizes to meet every fluorescent installation need.

Harvey Hubbell, Inc., Bridgeport, Conn.

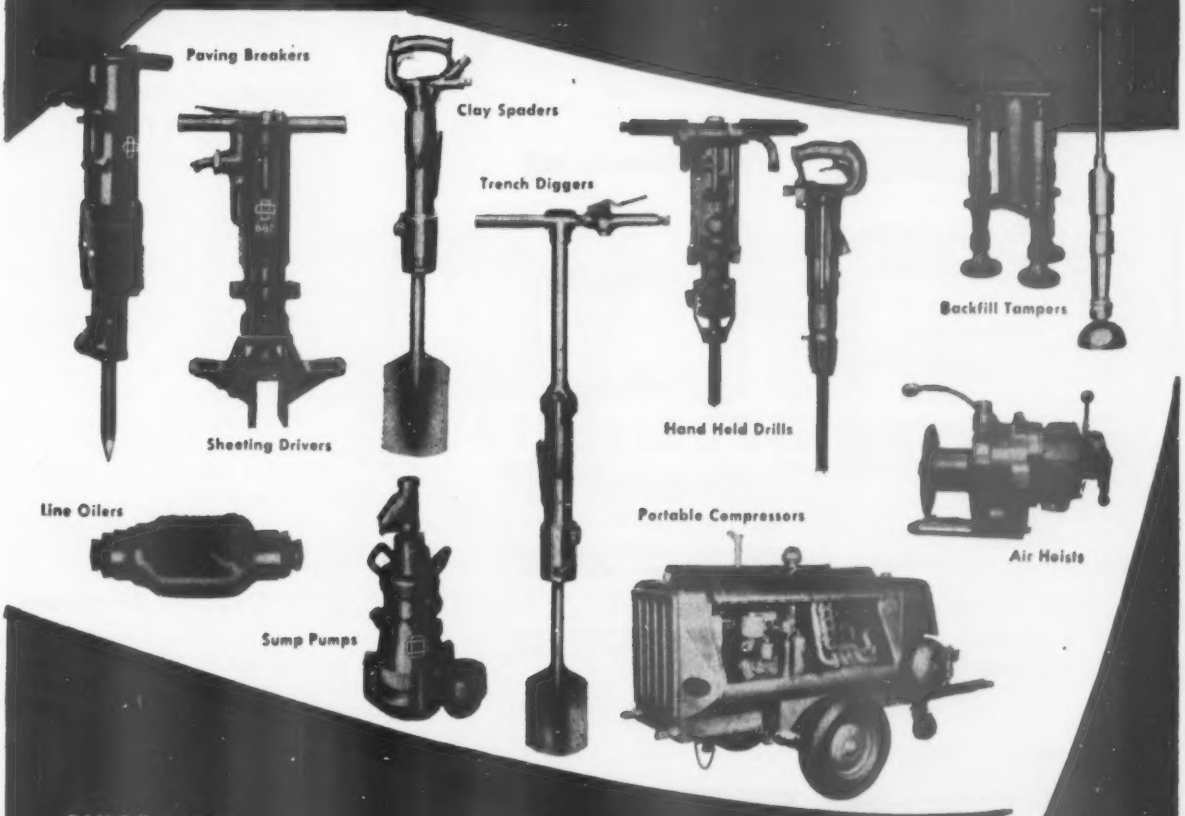
Turn the page

PLAN YOUR WORK

. . . for saving maintenance time, money and effort.

WORK YOUR PLAN

. . . with sturdy, fast-acting, easy-to-handle Gardner-Denver maintenance tools



SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Avenue, Toronto 13, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

TRY TRADE ARRO MARK

MASONRY ANCHORING DEVICES

for maximum holding power

Arro anchoring devices are designed to give you **MAXIMUM HOLDING POWER** . . . year in and year out. When you think of anchors, think of Arro!

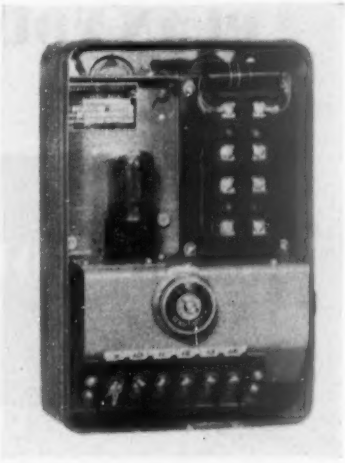
See your industrial, hardware or electrical supplier

ARRO EXPANSION BOLT COMPANY

1420 BOONE AVE., MARION, OHIO

NEW ELECTRICAL EQUIPMENT

Begins on page 150



Electronic Relay With High Sensitivity

This electronic relay is highly sensitive to resistance changes and can be varied by a stepless dial.

Stops and starts a fractional horsepower motor directly by instruments. When the contact making ammeter, voltmeter, or watt meter reaches the required reading, it sets off the relay.

Power requirements are 115/230 volts a-c, 50/60 cycles.

General Electric Co., Schenectady 5, N. Y.

■

Connectors for Use With Copper, Aluminum

Either aluminum or copper conductors can be attached to distribution transformers with these connectors.

This has been a problem because of the different characteristics of the two metals. The connectors, built with a stainless-steel spring, securely grip the wire and break down the aluminum oxide coating.

The spring maintains a tight hold even when cold-flow occurs, the manufacturer says.

General Electric Co., Schenectady 5, N. Y.

Turn the page

Enter this Lyon Den with Confidence

There are two big reasons why your Lyon Steel Equipment Dealer is a good man to know.

First, a highly diversified line of more than 1500 standard Lyon items enables him to meet the varying needs of business, industry and institutions — *better.* (A very few typical Lyon products are shown below.)

Second, he's a source of sound counsel in getting the most out of steel equipment in terms of savings in time, labor and money.

Lyon also has complete design and production facilities for special contract work.

FACTORIES IN . . . AURORA, ILL., AND YORK, PA.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 812 Monroe Avenue, Aurora, Illinois

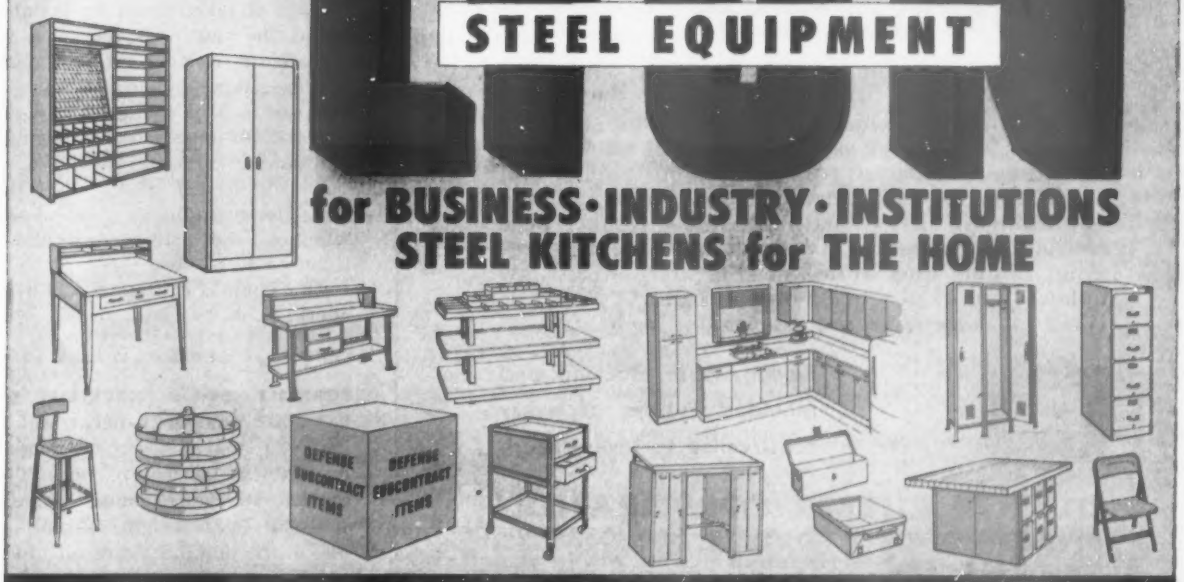
Dealers and Branches in All Principal Cities

LYON®

STEEL EQUIPMENT

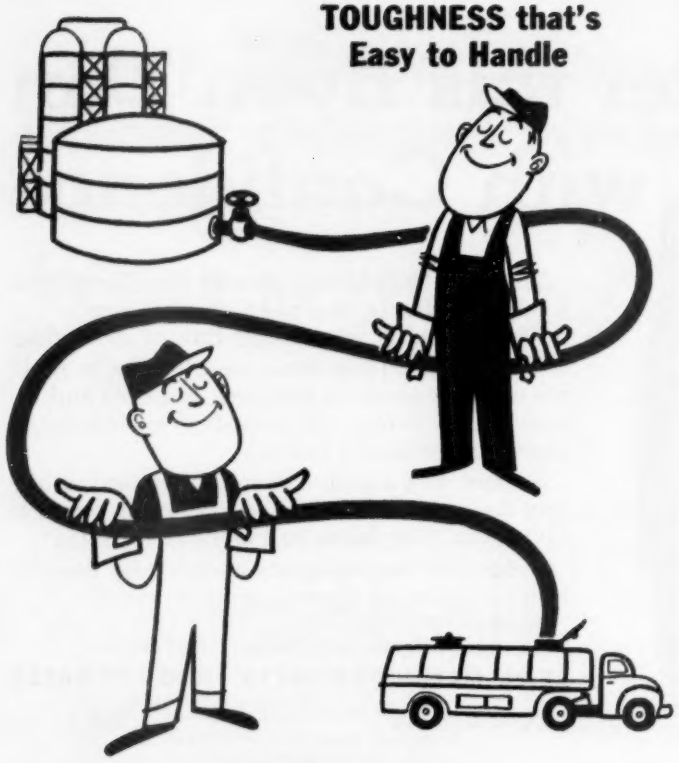
for BUSINESS • INDUSTRY • INSTITUTIONS

STEEL KITCHENS for THE HOME



A PARTIAL LIST OF LYON STANDARD PRODUCTS

- Shelving
- Lockers
- Stools
- Bin Units
- Kitchen Cabinets
- Cabinet Benches
- Storage Cabinets
- Drawing Tables
- Tool Toters
- Bar Racks
- Tool Boxes
- Parts Cases
- Economy Locker Racks
- New Freedom Kitchens
- Toolroom Equipment
- Wood Working Benches
- Display Equipment
- Flat Drawer Files
- Revolving Bins
- Hanging Cabinets
- Filing Cabinets
- Folding Chairs
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks



Quaker

INDUSTRIAL HOSE

Toughness! Combined with flexibility and light weight! Whatever the job, whatever the liquid, gas or substance—Quaker has a hose that's exactly right for it! Always as light in weight as working conditions will permit, always easy to handle and no trouble to use! Engineered to withstand any "punishment" it's called on to take, Quaker hose resists high pressures, twisting, bending, deteriorating liquids and abrasion. For long wear, low upkeep, top value—insist on Quaker!
Write for name of nearest distributor

Belting, Hose, Packing and Moulded Rubber of every construction for every need.

QUAKER RUBBER CORPORATION
DIVISION OF H. K. PORTER COMPANY, INC.
OF PITTSBURGH
PHILADELPHIA 24, PA.
Branches in Principal Cities

NEW ELECTRICAL EQUIPMENT

Begins on page 150

Paging System Uses A-C Power Outlets

Selective paging of supervisors and maintenance engineers is possible with this paging system. Operated by high-frequency pulses, portable units can be plugged into a-c power outlets to receive coded signals without special wiring.

Both audio and visual signals are originated at a central control station. Personnel using the system are assigned code numbers. Another coded signal gives the reason the person is being paged. Thus the system indicates not only who is wanted but also why he is wanted.

International Business Machines Corp., 590 Madison Ave., New York 22.

■

Liquid-Tight Fitting for Flexible Conduit

You can get a liquid-tight flexible conduit fitting that mates with any conduit spiral and doesn't have to be taken apart for installation, the maker claims.

Made in straight 90-deg. and 45-deg. elbows and accommodates a ⅜-in. to 2-in. conduit. Said to be good for machine tool wiring and similar circuits.

A color-coded plastic seal in the gland indicates size and whether the fitting is liquid-tight.

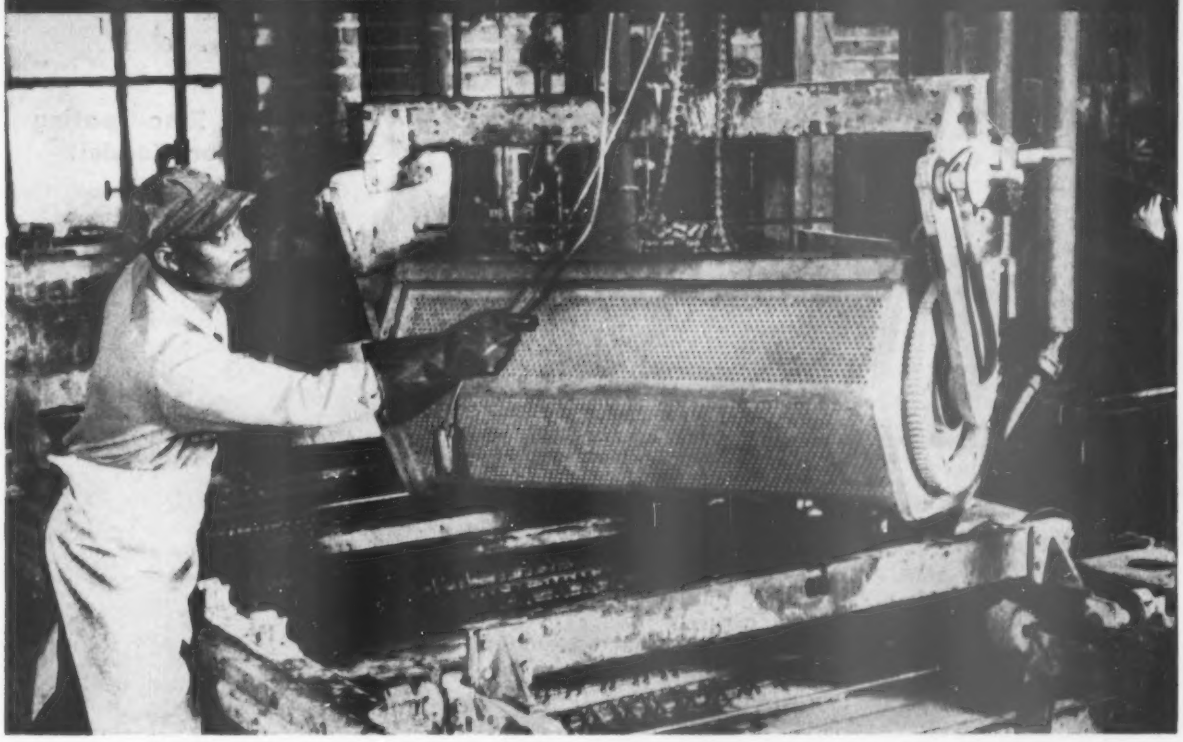
The Thomas & Betts Co., Elizabeth, N. J.

■

PORTABLE 250-kvp. INDUSTRIAL X-RAY UNIT that will penetrate 4 inches of steel has been developed by Holger Andreasen, Inc., 703 Market St., San Francisco. Small size and light weight of unit is due to the elimination of all high tension cables, cooling connections, separate transformers, and cooling pumps, maker says.

Turn the page

REFRIGERATION... MODERN PRODUCTION TOOL



Chilled electroplating bath increases plant output ...helps maintain quality

TEMPERATURE-CONTROL SYSTEM SOON PAID FOR ITSELF

As in so many industries today . . . temperature control is also of vital importance to the process of electroplating. Although a heat-generating operation, plating baths—such as that pictured above—must be kept cool . . . rigidly held between 75° and 90°F. Higher temperatures slow the procedure . . . adversely affect plating quality . . . may even lead to complete shutdown of a plant.

In controlling the temperature of plating baths, tap water circulated through cooling coils may often run too warm . . . particularly during summer months. To overcome this problem in their plant, the Plating Division of Great Lakes Industries, Chicago, installed a 50-ton water chiller. This consisted of a *Trane* refrigerating unit charged with Du Pont "Freon"*-12 refrigerant. The machine chills 150 gallons of lake water per minute to 45°F. for circulating through cooling coils in plating-bath tanks.

Automatic temperature control also permits use of high current density in the plating process . . . a method resulting both in a better product and production increases estimated as high as $75 an hour. Within six months, the water-chilling installation paid for itself.

Refrigeration—and air conditioning, too—are now serving industry in hundreds of ways. Both are helping solve production problems . . . saving time . . . reducing costs . . . improving product quality. Perhaps they can serve you as well. By far the majority of these modern refrigeration systems are operated with equipment charged with Du Pont "Freon" refrigerants. These are ideal for industrial applications of all types. They are safe . . . noncombustible, nonexplosive, virtually nontoxic . . . and are manufactured by scientific, laboratory-controlled methods that insure their quality and uniformity.

Whenever discussing installations for your own plant, office or home . . . be sure to ask your engineers to recommend machines designed to use "Freon" refrigerants. They meet all building code requirements everywhere. **A booklet: "How Air Conditioning and Refrigeration Benefit Industry" will be sent on request. E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Div., Wilmington 98, Delaware.**

KINETIC

**"Freon" is Du Pont's registered trade-mark for its fluorinated hydrocarbon refrigerants.*

"Freon" Safe Refrigerants

REG. U.S. PAT. OFF.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

This NEW METHOD DRIES AIR

PRECISELY as you want it

- to control your product's quality
- to prevent condensation on your product or material
- to prevent changes due to moist air in contact with your product
- to protect your material from dampness
- to protect your processing of moisture-sensitive material
- to DRY your material or product
- to pack or store your product safe from moisture damage
- to get exact moisture control for the precise atmosphere condition you need
- to provide precise atmospheric conditions for testing
- to increase your air conditioning capacity
- to DRY large quantities of fresh air from outdoors

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always. Niagara machines using liquid contact means of drying air have given over 20 years of service.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

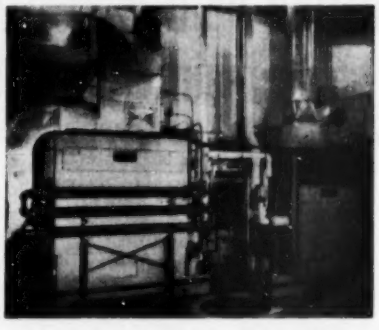
Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

Most compact, taking less space for installation.

Inexpensive to operate because . . . no re-heat is needed to obtain the relative humidity you wish in normal temperature ranges and frequently no refrigeration is used to remove moisture.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.



Niagara Controlled Humidity Air Conditioning

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

For complete information write

NIAGARA BLOWER COMPANY

Dept. F, 405 Lexington Ave., New York 17, N. Y.

District Engineers in Principal Cities of United States and Canada

NEW ELECTRICAL EQUIPMENT

Begins on page 160

Improved Zinc-Coating Process for Conduit

Rigid steel conduit is zinc-coated by process called metallizing. Does not harden the conduit or form brittle zinc-iron alloy, maker says. Pure zinc sprayed through flame onto the conduit in a plastic state, bonds to both pipe and threads to provide lasting protection against corrosion, the manufacturer says. It is claimed this is the first application of metallizing to rigid conduit.

The white rigid conduit also has an anti-friction inside coating to make wire pulling easier.

General Electric Co., Bridgeport 2, Conn.

■

Hook-Up Wire for Electronic Uses

All-purpose shielded hook-up wire for electronic and low-current electrical applications has high-temperature thermoplastic insulation.

Good workability and durability; insulation is easily stripped and will not creep back during soldering, maker says.

Said to be abrasion resistant, flame-proof, fungus-proof, and solvent-proof.

Boston Insulated Wire and Cable Co., 65 Bay St., Boston.

■

Versatile Toggle Switch

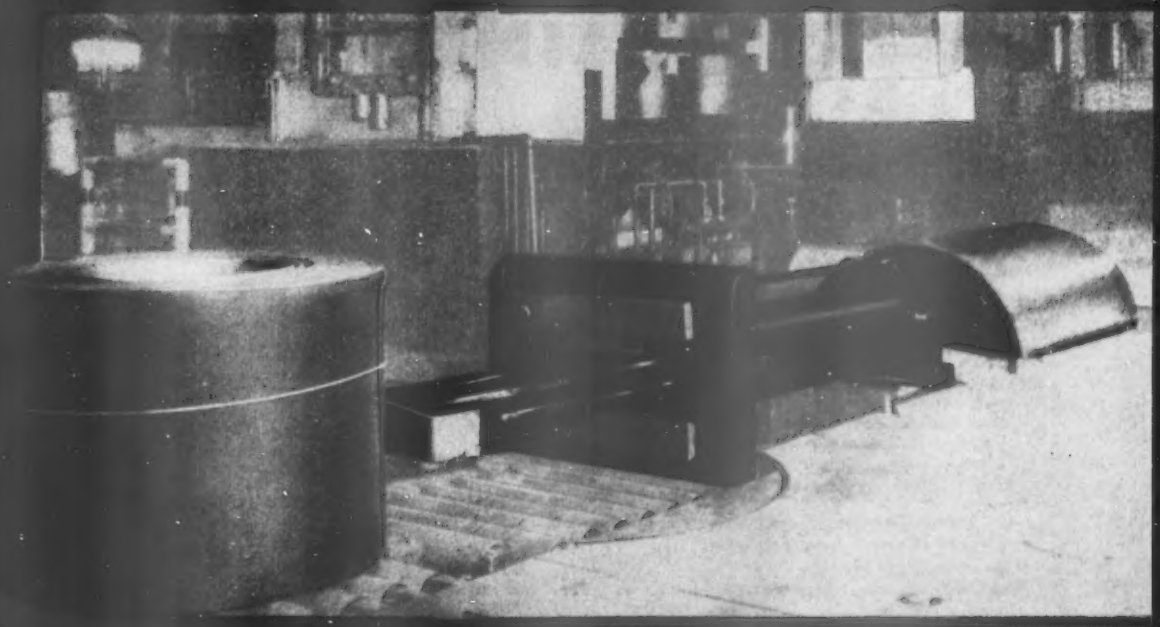
Here's a waterproof, dust-tight and shockproof toggle switch. Will operate at temperatures from –65 F. to 165 F.

Mechanism is enclosed in a rubber casing. The switch has a continuous rating of 175 amperes at 15 to 30 volts d-c or 125-volts a-c. Maximum in-rush capacity is 500 amperes.

Riverside Manufacturing & Electrical Supply Co., 1022 Michigan Ave., Dearborn, Mich.

Turn the page

HOW LINDBERG



U. S. Steel had a special job to do. Huge, heavy coils of sheet steel — some of them, 4' in diameter and 6' high, weighing up to 25,000 lbs. — had to be pushed, tilted, and pulled for positioning on a system of gravity conveyors leading to the entry end of the pickle line.

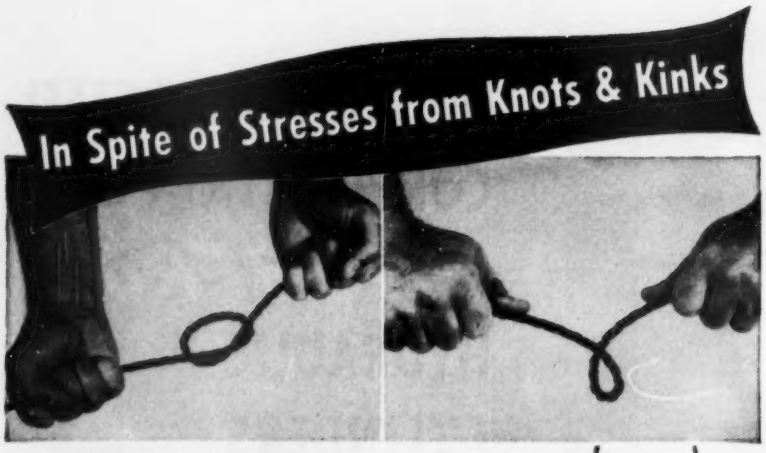
A special Lindberg Hydraulic Cylinder installation was designed to handle this "special" job. It consisted of seven king size Lindberg Cylinders, including one of the longest stroke, single piece cylinders ever built — 8" by 288". From the storage area, over the conveyor system, to the entry end of the pickle line, Lindberg Hydraulic Cylinders handled the job . . safely and dependably.

U. S. Steel is but one of the many companies who are using Lindberg Cylinders on tough applications that call for special engineering.

If yours is one of those "almost impossible" jobs, make arrangements to talk with a Lindberg Air and Hydraulic Cylinder Engineer. They're "special cylinder specialists" — eager to work with you on the design of any special cylinder installation.

LINDBERG AIR . . HYDRAULIC CYLINDERS

Lindberg Engineering Company, 2450 West Hubbard Street, Chicago 12, Illinois



Tuffy SLINGS

Last Longer to Help You Cut SLING COSTS

BRAIDED CONSTRUCTION is the Reason!

Knot it! Kink it—if you can! See how easily the patented braided construction of Tuffy Slings straightens out without damage. Only Tuffy gives you this extra flexibility and long-life strength—because ONLY TUFFY has this 9 part machine-braided wire fabric construction that fights off knots and kinks, yet stands up longer when such stresses of distortion happen. Mail coupon for your FREE 3-ft. sample of Tuffy Sling fabric and test it yourself!

A Steel Company Reports: "...*outlasted former slings 3 and 4 to one.*"

One month's service was tops—until Tuffy showed how they could get 3 and 4 times longer service—at big savings on sling costs.

SEND FOR THIS FREE BOOK!

Get the facts—and save! Here's useful data on 12 braided sling types . . . various types of sling fittings, 30 illustrations of sling uses, information on splicing Tuffy Slings and Wire Rope. It's yours for the asking! Mail coupon today!

union Wire Rope **corporation**

Specialists *In Wire Rope and Braided Wire Fabric*

2234 Manchester Ave., Kansas City 3, Mo.

☐ Send FREE Tuffy Sling Handbook and Rigger's Manual

☐ Have my Union Wire Rope Fieldman deliver to me FREE a 3-Ft. sample Tuffy Sling

*Firm Name*_____

*By*_____ *Title*_____

*Address*_____ *City*_____ *State*_____

NEW ELECTRICAL EQUIPMENT

Begins on page 150

Light, Portable X-Ray Equipment

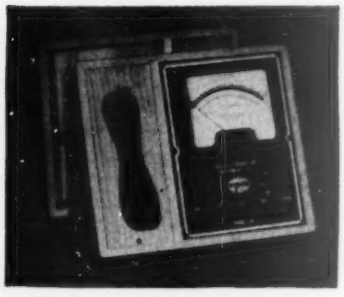
Believed to be the smallest, lightest, and most easily portable industrial X-ray equipment on the market, the maker claims.

Complete unit weighs 223 pounds. X-ray tube head also contains high-tension generator.

Tube is fan-cooled and has an end port for close-in work. Operates on either 115 or 230 volts. Current drain is 20 amperes.

North American Philips Co., Inc., 750 S. Fulton Ave., Mount Vernon, N. Y.

■



Insulation Tester With Four Ranges

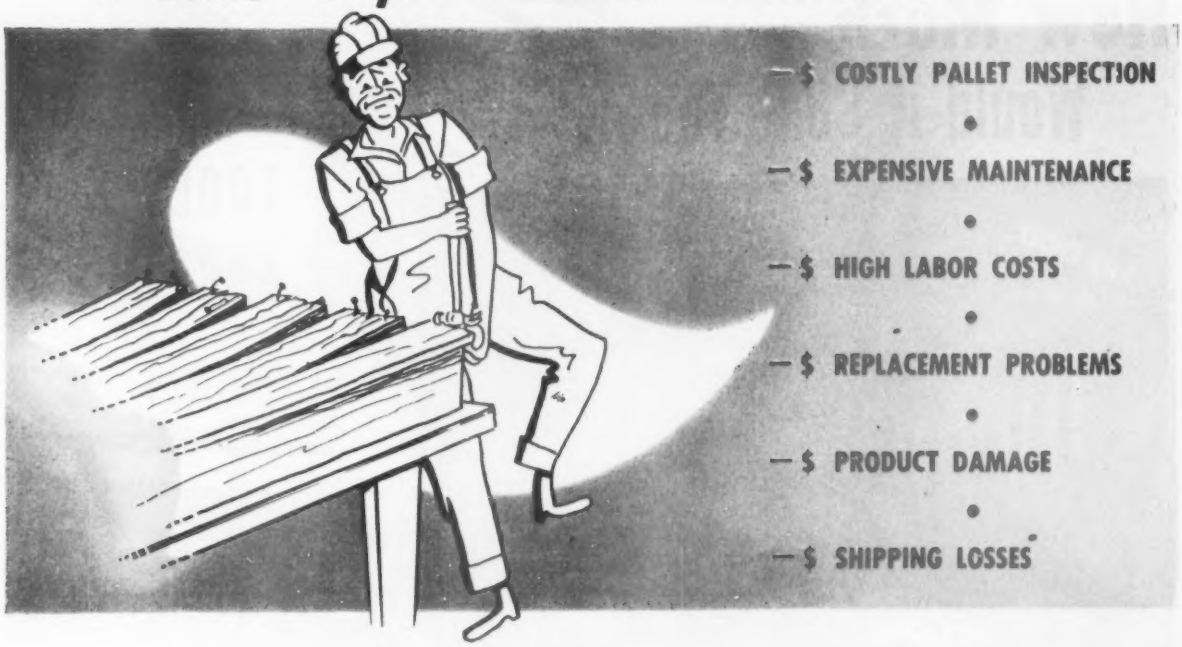
Portable insulation tester with 4 ohm ranges requires no external current source. It measures insulation leakage from zero to 200 megohms at a potential of 500-volts d-c.

A low ohm scale permits testing of coils and armature windings.

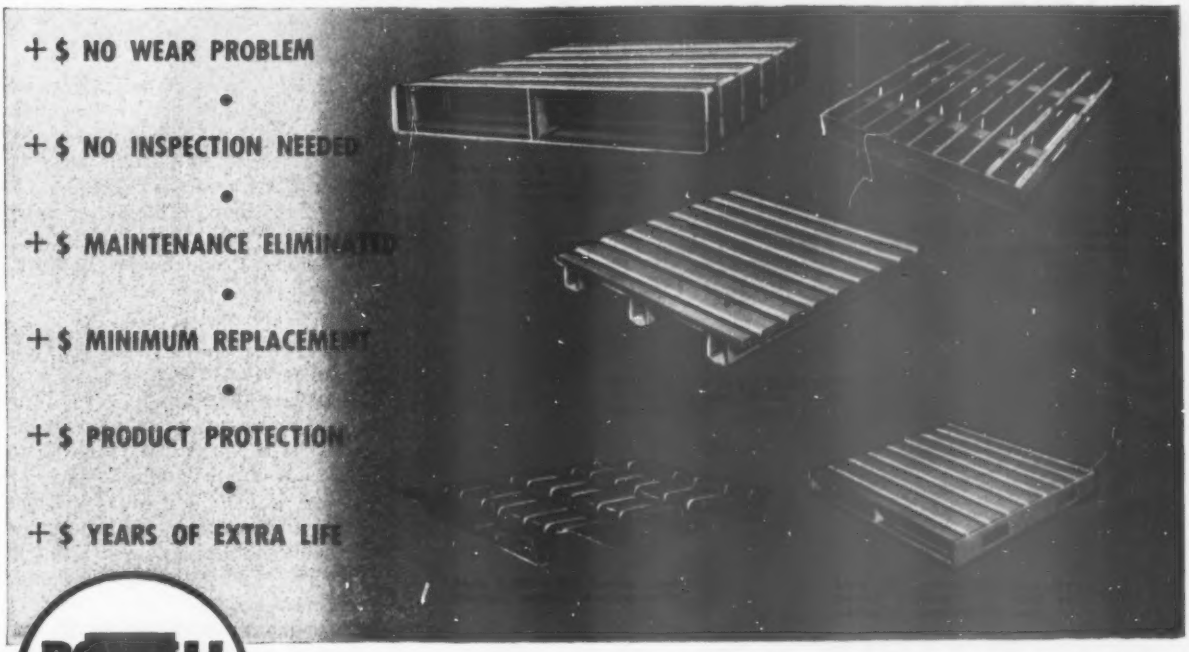
Epco Electronics, Inc., 140 Liberty St., New York 6.

Turn the page

If THIS is your Pallet Problem...



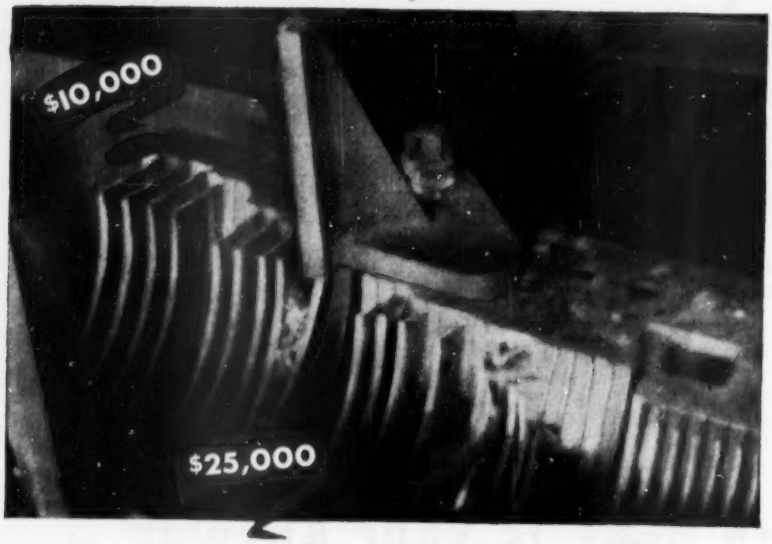
Then HERE is your Answer...



THE POWELL PRESSED STEEL COMPANY
HUBBARD, OHIO

How Much Would it Cost You...

$5,000



If This Happened to Your TURBINE

$50,000

● Replacement of turbines is costly . . . even in the case of minor repairs, labor, parts and downtime costs soon mount up. To go under the assumption that the installation of superheaters in a boiler eliminates the need for purifier protection is dangerous. Particularly during startup and periods of faulty boiler operation such as occurred above, all turbines should have Hi-eF Purifier protection. These high efficiency units assure you of the delivery of cleaner, drier steam of better than 99.95% quality.

Write, wire or phone today for information on protecting your steam-using equipment and boilers with Hi-eF Purifier.

ANDERSON Hi-eF PURIFIERS

WATCHDOGS OF STEAM • AIR • GAS • VAPOR Pipelines and Equipment

THE V. D. ANDERSON COMPANY

1997 W. 96th Street – Cleveland 2, Ohio

Please send information on the following types of purifiers:

☐ Line Type ☐ Internal ☐ Receiver

Name ..... Title .....

Address .....

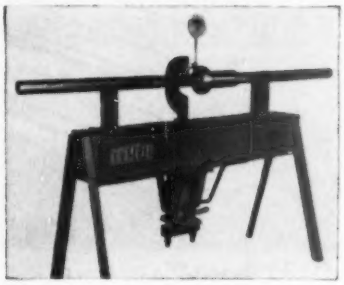
City .....

State .....

BY THE MAKERS OF SUPER-SILVERTOP STEAM TRAPS

Begins on page 140

MAINTENANCE TOOLS & SUPPLIES



Straightening Press Takes Longer Pieces

This press handles from 1- to 10-ft. lengths of shafts and bars. Makes it possible for any shop to do its own straightening work, the maker says.

Features a sawhorse-like frame with underslung hydraulic pump and cylinder. V-block and pump are movable to permit press to handle various shaft-lengths.

Press measures 65 inches along the bed.

Lempco Products, Inc., Bedford, Ohio.

■

Longer-Lasting Roofing Mops

Roofing mops, made with Fiberglas, will withstand from 10 to 20 days of continuous service.

Hot asphalt and pitch will not char or burn the yarn. The mops take temperatures up to 1000 F. without disintegrating, the maker claims.

Available in skeins 24, 28, 32, and 36 inches long. Mops can be cleaned easily.

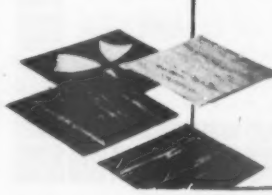
Owens - Corning Fiberglas Corp., Toledo.

Turn the page

Should flooring problems be dropped on the company president's lap?

FLOORS can be a sound investment—or an overly-costly expenditure—depending on how well suited they are to the area where used. For example, a corridor requires certain qualities in a floor ... cafeterias present totally different flooring problems ... basement utility rooms must meet still other standards.

And, because maintenance costs, public approval and over-all profits are affected, you'll benefit by calling in a Kentile Flooring Contractor—to make sure the floors you choose are the right floors ... the floors that will last the longest ... look the best ... for the smallest cost.



Call the Kentile, Inc. Flooring Contractor* for up-to-date information about these floors

- ✓ *KENTILE ASPHALT TILE*
- ✓ *SPECIAL (greaseproof) KENTILE*
- ✓ *KENCORK FLOORS AND WALLS*
- ✓ *KENRUBBER TILE FLOORS*
- ✓ *KENFLEX VINYL TILE*

KENTILE INC.

*If you don't know the name of your Kentile, Inc. Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.

It's MORE than fire safety, SIR . . .
AIR FOAM
CO2
FIRE FOG
THROUGHOUT ENTIRE BUILDING.
SPECIAL HAZARD PROTECTION IN CIRCLED AREAS
. . . . it's
ENGINEERED
"Automatic"
fire protection
When it comes to the planning of fire protection for your plant or business, there's considerably more to be viewed than the price. Of course, you will want to be fully informed on the economies of protecting your property, but it's equally important to know that the method of protection is the best available for any given area of your building.
It is for that reason that through the years we have not limited ourselves to the design and installation of only certain types of protection. Like you, we study the economic factors involved. Then, following a thorough investigation of all elements of your overall fire safety problem, we design, manufacture and install the type of protection best by test for maximum safety. It's engineered "Automatic" FIRE PROTECTION for you . . . the finest available at any price!
Why not find out how engineered "Automatic" FIRE PROTECTION can save dollars for your business whether you ever have a fire or not. Remember, what's worth insuring is worth protecting. .
Write for Bulletin 66, the ABC of Fire Protection. It's FREE.
"Automatic" Sprinkler
CORPORATION OF AMERICA
YOUNGSTOWN, OHIO
Offices in principal cities of North and South America

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 160

Abrasive File Fed From Roll

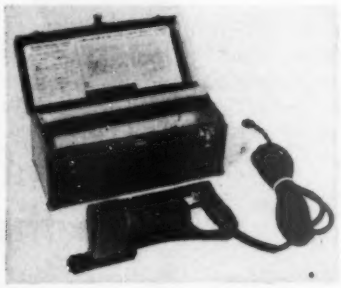
Here's an abrasive file fed from a 6-ft. roll of abrasive cloth. The cutting surface can be dispensed as needed.

Known as the Red Flash, it's designed for use in filing, deburring, and other finishing operations.

The file has an 11-in. stroke. When the file wears out all that is needed is a change in the roll.

Minnesota Mining & Manufacturing Co., 900 Fauquier St., St. Paul.

■



Electric Hammer With Snap-Back Action

The Super Slugger electric hammer has neoprene blocks to give snap to each of its 3000 blows per minute.

Because of the resiliency of neoprene blocks, piston travel has been increased to 1⅛ inches at full speed. There is no vibration or shock on motor or operator, the maker says.

Tempo Products Co., 2075 E. 65 St., Cleveland 3.

Turn the page

PALLETAINERS AT WORK...

cutting production costs!

Got a production lag problem? Whether it's in foundry, pressroom, or assembly line, you may find USP Palletainers are the answer you've been seeking. Just look how these convenient, versatile units find key places for themselves! Natural receptacles for forgings, stampings or finished parts, they can be moved quickly, easily to the next operation. And to the next and the next! New design of extra-strong malleable cast legs provides eight-way entry for fork trucks. Reinforced steel rod construction is virtually indestructable for unusual protection of 6000 lb. maximum load. Palletainers are perfect for temporary storage, for warehousing, and for shipping, too! They even fold flat when empty to save you return freight costs. Write today and learn how little it costs to start Palletainers working for *you*.

USP — A SYMBOL OF QUALITY

UNION STEEL PRODUCTS COMPANY

ALBION, MICHIGAN

1903 *Our Golden Anniversary* 1953

CESCO RIGHT... before your Eyes!

New, Larger COVER GOGGLES

fit over ALL modern glasses...

New CESCO Cover Goggles fit well over all popular styles of glasses—even over extreme types such as these.

FEATURES

Lightweight, sturdy plastic with contoured edges. Weight is well-distributed for comfort and safety.

LENS VENTILATORS

Slots in edges of lens frames and rings are offset to baffle air flow.

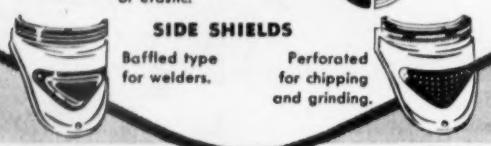
HEADBANDS

Three types, all fully adjustable—Comfort King round rubber, flat rubber, or elastic.

SIDE SHIELDS

Baffled type for welders.

Perforated for chipping and grinding.



The *NEW* CESCO series 548 and 549 Cover Goggles are 20% larger than former cover goggles and will fit comfortably over all popular styles of men's or women's glasses. Newly designed, contoured edges eliminate pressure points on the nose and seal out flying particles or light flashes. Larger air space within goggles reduces fogging.

Screw-type retaining rings permit quick lens change from front. Standard 50mm lenses set flush with rings to deflect flying objects. Chippers style has indirect ventilation through slotted lens rings and direct ventilation through perforated side shields. Welders and dust models have indirect ventilation through side shields. Simplified bridge adjustment. Choice of 3 adjustable headbands: elastic, flat rubber or Comfort King round rubber.

For a really modern goggle, there is nothing better than the **No. 548** CESCO Cover Goggle. It is *"Right... before your eyes!"*

See or write your CESCO safety equipment distributor for full details

CHICAGO EYE SHIELD COMPANY • 2312 Warren Blvd. • Chicago 12, Ill.

CESCO FOR SAFETY

OFFICES IN: Atlanta, Birmingham, Boston, Buffalo, Cincinnati, Cleveland, Columbus, Detroit, East Orange, Houston, Kansas City, Knoxville, Little Rock, Los Angeles, Mexico City, D. F., Milwaukee, Montreal, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Spokane, St. Louis, St. Paul, Toledo, Tulsa

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 160

Portable Conveyor for Maintenance Jobs

Here's a lightweight, portable conveyor, level or lift, for the maintenance department. Maximum efficient angle is 44 degrees, maker says.

The conveyor comes in standard lengths of 10 to 20 feet. It can be powered by an electric motor.

New London Engineering Co., 1700 S. Division St., New London, Wisc.

■

Hollow-Headed Ratchet Wrench

Designed to drop down over any length stud or rod and ratchet the fitting, wrench eliminates need for long sockets, extensions, and adaptors, maker says.

This hollow-headed socket wrench is called Life Saver. Ratchet will operate in an arc as small as 7 degrees. Available to handle hex nut sizes from $\frac{3}{8}$ to $2\frac{1}{8}$ inches.

Tubing Appliance Co., 10321 Anza Ave., Los Angeles 45.

Turn the page

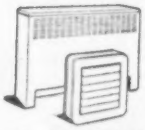
FASTEST THING IN FASTENINGS®

"U" TYPE "J" TYPE

SPEED NUTS® are one-piece, self-locking, spring steel fasteners. Snap over panel edges or center hole locations . . . self retained in screw-receiving position for easier, faster assembly in "blind" locations. Available for a full range of screw sizes and panel thicknesses.

SPEED NUTS Saved 6,144 Assembly Hours, Thousands of Production Dollars

Reports the Trane Co., La Crosse, Wisconsin



"Every time we use a SPEED NUT, we save 14 seconds in production time", say Trane engineers. In one year, this leading manufacturer of air conditioning, heating and ventilating equipment netted 6,144 extra assembly hours, plus amazing savings in materials and materials handling. Misalignment of ventilator weld nuts and mounting holes slowed production continuously. Replacing them with "U" type SPEED NUTS, which snap in place by hand and provide floating alignment, ended this bottleneck. Costly installation of convector heater coil headers was overcome with "J" type SPEED NUTS. Snapped directly on frame members, they eliminated eight cast iron drilled and tapped ears and two welded support brackets. SPEED NUTS, applied after painting, eliminated masking or retapping of threads—licked rust problems.

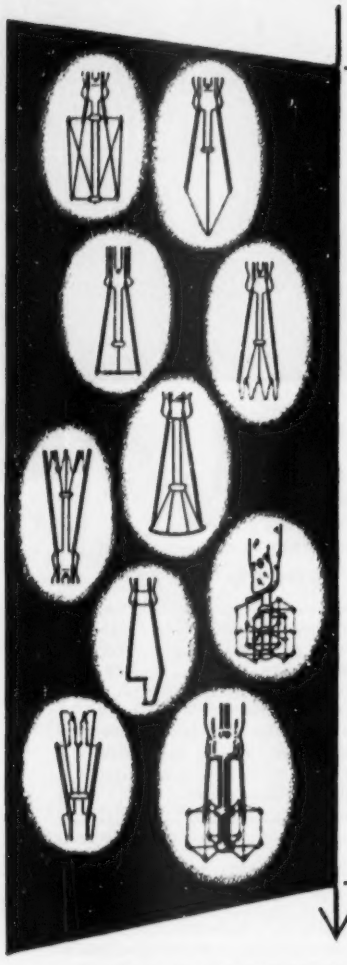
Call in your Tinnerman representative for a FREE fastening analysis of your product . . . he may find comparable savings for you through greater fastening efficiency.

Send today for your copy of "SPEED NUT Savings Stories", a booklet of savings for industry. Write: TINNERMAN PRODUCTS, INC., Box 6688, Dept. 12, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners, Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A.—7 rue Henri Barbusse, Levallois (Seine).

TINNERMAN Speed Nuts®

MORE THAN 8000 SHAPES AND SIZES

Filamentary facts about Champion Lamps



FACTS OF LIGHT

For a 60 watt filament you start with a straight piece of tungsten wire 21 inches long, drawn to a diameter equal to just 2/3rds the thickness of this page. When this wire has been coiled 1200 times around a molybdenum mandrel, drawn with a tolerance 1/30th the thickness of this page, its length becomes 3.4 inches. For higher concentration of heat and, hence, more light, the coil is coiled again to a double coil only 5/8ths inch in length.

After the molybdenum mandrel has been dissolved by acid, the length and uniformity of each pure tungsten coil must pass relentless inspection. Microscopic variations can seriously impair lamp life. Weight is tested on equipment that can weigh a pencil mark.

Working with wire so fine as to be almost invisible, to tolerances measured in millionths, Champion experts produce filaments that cannot be surpassed in performance. Starting at the very beginning of the lamp industry, Champion has taken advantage of every scientific advancement and quality control technique to produce Lamps for industry that provide unsurpassed service and value.

•

Pictured are a few basic filament arrangements for Champion Incandescent Lamps, each designed for specific service needs.

There is a distributor of Champion Incandescent and Fluorescent lamps near you. Do get in touch with him for intelligent and efficient cooperation on your lighting needs.

Let us mail you a new booklet C, CHAMPION QUALITY, containing the complete interesting story on Champion Lamps for industry.

CHAMPION SINCE 1900

CHAMPION LAMP WORKS

Lynn, Massachusetts

A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 160

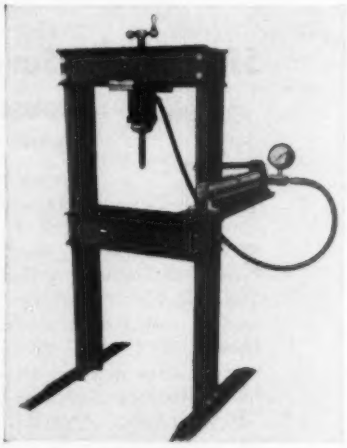
Self-Contained Strapping Kit

This steel strapping kit, called Utilikit, is easily carried from job to job in plants, shops, and storage yards.

Contains 300 feet of steel strapping, strapping seals, and three basic tools: stretcher, sealer, and snips.

Brainard Steel Div., Griswold St., Warren, Ohio

■



Hydraulic Shop Press

This hydraulic press can develop up to 17½ tons pressure. Comes equipped with a hydraulic hand pump and a 15,000 psi. gage to measure actual pounds or tons pressure used.

The ram can be easily detached and used as a portable power unit.

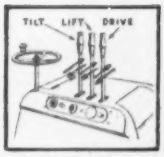
Owatonna Tool Co., 388 Cedar St., Owatonna, Minn.

Turn the page

ONLY MOBILIFT STAND-UP FORK LIFT TRUCKS

Give You

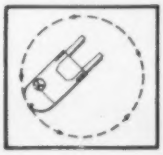
Lev-R-Matic DRIVE



- No Gears to Shift
- Speeds All Movements

MOBILIFT MOBILITY

- 360° Steering— ZERO Inner Turning Radius
- Excels in Close Quarters



MOBILIFT STAND-UPS

- Ample Size Platform
- On and Off in Seconds
- All Around Visibility

Only MOBILIFT Stand-Up type Fork Lift Trucks give you Lev-R-Matic push-pull controls for forward-back, elevating, tilting...THERE ARE NO GEARS TO SHIFT!

Only MOBILIFTS give you MOBILIFT agility and quickness with their compact design, short overall length, 360° steering and ZERO inner turning radius. They excel in congested areas.

Only MOBILIFTS give you perfected Stand-Up models—for *more* work, *faster* work, *less* operating expenses.

To these *plus* advantages add MOBILIFT air-cooled, 3-cylinder engine's reliable power and easy accessibility for minimum service and repair...the answer is obvious:

YOU'LL ACCOMPLISH MORE...WORK FASTER... EARN MORE WITH MOBILIFT FORK LIFT TRUCKS

Write for complete information

MOBILIFT Lev-R-Matic DRIVE

1 generalift pallet crate

replaced 6 heavy nailed crates

cut packaging costs 50%

reduced shipping costs 25%

McCord Corporation, Plymouth, Indiana, solved both a packaging and a materials handling problem with the Generalift Pallet Crate shown above. Conferences with General Packaging and Sales Engineers produced a crate which held 24 radiators, packed easily, and could be handled by fork-lift from the shipping room all the way to assembly lines. It formerly took 24 heavy nailed crates and from 24 to 30 hours of labor to ready 96 radiators for shipment. Packing the same number in Generalift Pallet Crates takes only 4 hours.

This is only one example of the many packaging problems solved every day—at a saving—in General Box Company's two fine Industrial Packaging Laboratories. General Box packaging experts stand ready to help *you* cut packaging costs, too. Write for complete details.

Find out how other manufacturers are cutting packaging costs. Write for your free copy of "The General Box."

General Box COMPANY
★ ★ ★ ★ ★
1807 Miner St., Des Plaines, Ill.

Factories: Cincinnati; Denville, N. J.; Detroit, East St. Louis, Kansas City, Louisville, Milwaukee; Prescott, Ark.; Shaboygan; Winchendon, Mass.; General Box Company of Mississippi, Meridian, Miss.; Continental Box Company, Inc., Houston

ENGINEERED SHIPPING CONTAINERS FOR EVERY SHIPPING NEED
• Generalift Pallet Boxes • Corrugated Fiber Boxes • All-Bound Boxes
• Cleated Corrugated and Watkins-Type Boxes • Wirebound Crates and Boxes

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 160

Direct Reading Chamfer Gage

Here's an instrument designed to measure diameters of chamfers up to one inch from zero degrees to 90 degrees. Readings are made directly.

Depth of the chamfer in a hole is easily computed. Saves time over other methods in finding the end of chamfer, the manufacturer claims.

Comes in a felt-lined wood case.

Acme Industrial Co., 200 N. Laflin St., Chicago 7.

■

Hacksaw Cuts Unlimited Length

Especially designed so maintenance men can cut through an unlimited amount of material without being restricted by the conventional hacksaw frame.

The hacksaw consists of a spring-loaded plunger with pistol grip handle and a guide tube that supports the regular 10- or 12-in. hacksaw blade.

Blade can be inserted through a ½-in. hole for sawing out floor boards and the like.

Alpha Tool & Supply Co., Closter, N. J.

■

Converts Rotary Drill to Thrust-Action Saw

Attachment converts electric drill into a thrust-action saw. This tool attachment eliminates the use of gears, the maker says.

Each drill revolution is turned into a ⅞-in. stroke by the cam-action saw. Specially designed blades make starting holes unnecessary.

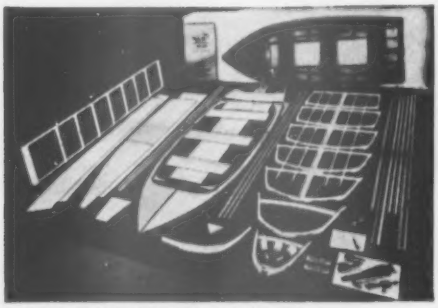
E-Z Way Tool Co., Barrington, Ill.

Turn the page

Acme Steel Strapping Insures S.A. *(Safe Arrival)*

Boat kits come in cartons secured by Acme Steel Strapping

BOAT IN A BOX. Carton in foreground contains all small parts for complete Chris-Craft. Now it's being secured for shipment by Acme Steel Strapping.



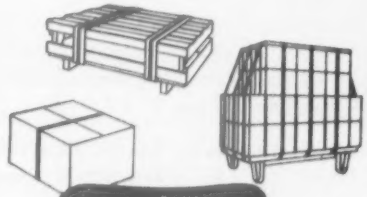
BUILD-IT-YOURSELF KIT contains all precut wood parts, jig and factory-assembled frames for a Chris-Craft De Luxe Runabout.

STRAPPING BOATS ON A TRUCK. When a truckload of boat kits leaves the Chris-Craft plant, Acme Steel Strapping both secures individual kits, and anchors whole load to truck for a safe journey.

The pictures tell the story. That's the way that Acme Steel Strapping helps a leading manufacturer solve a tough packing problem and insure Safe Arrival of his goods.

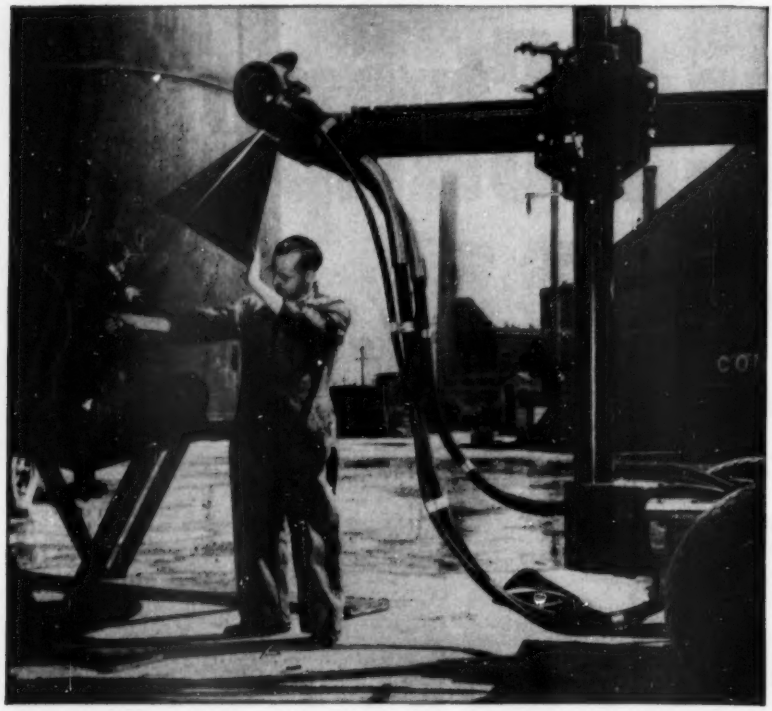
Most likely Acme Steel Strapping can serve you, too. It guards against damage to goods in transit. It saves on labor costs because it's so quick and easy to apply. It takes the place of bulkier, costlier packing materials.

If you have a problem like this, Acme Steel Strapping or Acme Steel Stitching Wire methods may provide just the solution you need. Write Acme Steel Products Division, Dept. FMM-83.



ACME STEEL

Acme Steel Products Division **ACME STEEL COMPANY** 2840 Archer Avenue, Chicago 8, Ill.



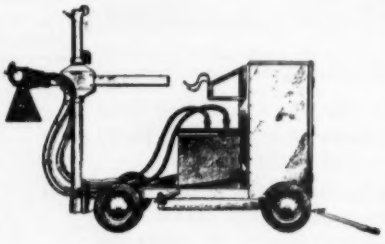
Costly Repair Avoided by Early X-ray Inspection

The Lang Company, Inc., of Salt Lake City, Utah, makers of pressure vessels, uses the Westinghouse 250 KV Mobile X-ray Unit extensively throughout their plant. This mobile unit moves easily to the fabrication site. A complete X-ray inspection is quickly made, and defective welds are replaced at a lower cost than if found after pressure tests.

Throughout the metal-working industry the Westinghouse 250 KV Mobile X-ray Unit handles many equally important money-saving tasks. If internal defects increase your costs, this X-ray unit will help you lower them.

Westinghouse has X-ray sales offices across the nation; they are staffed by experienced men who can help you solve inspection problems, and who can demonstrate savings. Call your nearest X-ray representative or write to the address below.

J-08267



Westinghouse Electric Corporation, X-ray Division, Dept. M-67
2519 Wilkens Avenue, Baltimore 3, Maryland

YOU CAN BE SURE...IF IT'S

Westinghouse

WHAT'S NEW IN EQUIPMENT
Begins on page 140

MATERIALS HANDLING

Vertical Conveyor for Handling Cases

This vertical belt conveyor has automatic in-feed and discharge.

Cases are fed from a horizontal conveyor into the vertical system, where they are tightly gripped between friction-surface conveyor belts, augmented with spring-loaded rollers.

At the top of the conveyor, an off-set roller discharges the cases onto another horizontal conveyor.

Conveyor Specialties Co., 666 E. 3rd St., St. Paul, Minn.

■

Power-Driven Chain Conveyors

Especially designed chain conveyors handle all types of bottles, cans, and similar work-in- process.

They are constructed of hot-rolled or stainless steel. Clean-out holes along both sides provide access to underside.

The drive motor is mounted on one end of the frame. Units are 3½ to 4½ inches wide.

Sage Equipment Co., 31 Essex St., Buffalo 13.

Turn the page

LEWIS-SHEPARD

16-8 WALNUT ST., WATERTOWN 72, MASS.

Please send

☐ Electric Fork Truck Comparison Chart.

☐ Proof Folders showing L-S Trucks at work.

Name .....

Company .....

Street .....

City ..... State .....

with KEX wiping towels...

"I decided long ago to stop buying scrap rags and waste by the pound and switch to Kex wiping towels because a lot of the stuff we were getting wasn't usable. It had no uniformity and the men had to pick and choose the right piece for every job. That isn't true with Kex—every square inch is usable.

"After the first few months of using Kex Service my month-end cost for wipers was down substantially! The men have a uniformly-sized, absorbent towel for every job. And we don't run the risk of scratching or damaging delicate precision machinery."

YOU DON'T BUY A THING—just pay a low monthly rental. Kex towels are distributed nationally—for complete information, see your Classified Telephone Directory for nearest Kex distributor, or write Kex National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE

REG. U.S. PAT. OFF.

It isn't Kex unless it's imprinted with the Kex name

MATERIALS HANDLING EQUIPMENT

Begins on page 170

Rotating Conveyor Spur for Double-Duty Use

Flip Switch is a rotating conveyor spur or Y-switch that can connect a two-way belt conveyor with either of two wheel-conveyor lines set at different levels.

Two gravity-wheel sections, mounted back to back on a rigid frame, form the Flip Switch section. The entire assembly is pivoted at both ends.

This unit eliminates the need for detaching straight or curved sections each time the flow of materials is changed. It is for use with 18-in. wide wheel conveyors.

Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids, Mich.

■

Diesel-Powered Bulk Handler

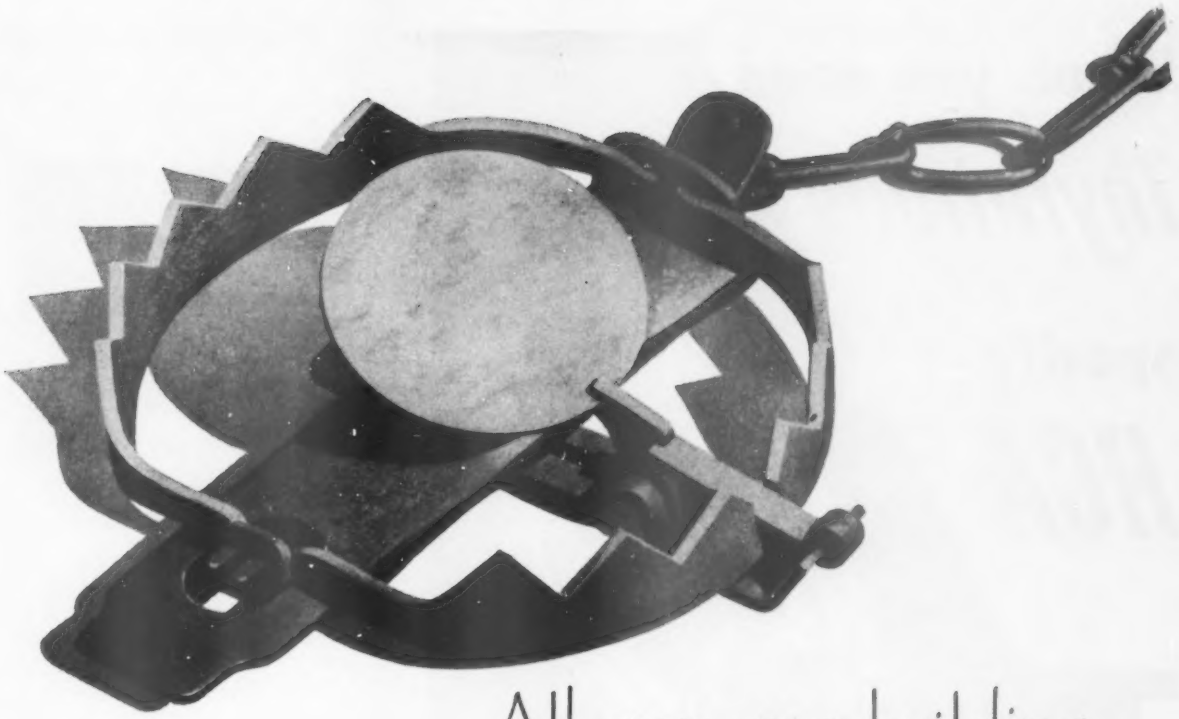
Here's a diesel powered unit with a capacity of 3000 pounds for handling bulk materials.

Caster steering allows it to turn within its own length of 90 inches. Highly maneuverable, with speeds up to 15 mph.

Equipped with either flat rack or 14-, 16- or 20-cu ft. dump-box bodies.

Getman Bros., South Haven, Mich.

Turn the page



All over your building, fire sets its traps. In dip tanks, transformer vaults, storage spaces. In fact, wherever it can stop your business in its tracks. Make sure you don't fall victim. Post a KIDDE Portable Extinguisher next to every fire hazard.

Kidde

Walter Kidde & Company, Inc.,

832 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

When you need *Thyratrons* specify *RCA*

For prompt service on RCA Tubes call your local RCA Tube Distributor

RCA Thyratrons help to prevent costly shutdowns

As a result of rigid quality control methods and stringent tests, RCA Thyratrons provide reliable performance even under tough service conditions. You get *Performance Security* with RCA Thyratrons. This means extra hours of service . . . fewer shutdowns of equipment due to tube troubles . . . equipment operation at higher efficiency.

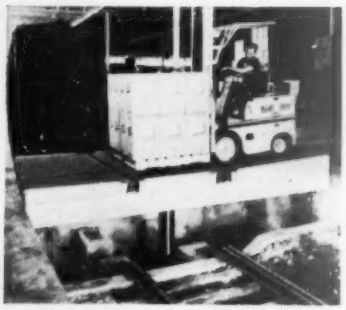
TECHNICAL INFORMATION FOR YOUR REFERENCE

The 20-page booklet "RCA Power and Gas Tubes" contains technical information on a wide line of thyratons — gas and mercury-vapor types, triodes and tetrodes, miniatures and jumbo sizes. For your FREE copy write to: RCA, Commercial Engineering, Section 71HT, Harrison, N.J., or obtain a copy from your local RCA Tube Distributor.

RADIO CORPORATION of AMERICA
ELECTRON TUBES — HARRISON, N. J.

MATERIALS HANDLING EQUIPMENT

Begins on page 170



Hydraulic Bridge for Railroad Wells

Does a railroad spur cut through the middle of your plant? Here's a hydraulic bridge to provide a shortcut over the track well.

The bridge raises to permit transfer of materials from one side of the spur to the other, then lowers to become an integral part of the track system.

Rotary Lift Co., 1099 Kentucky, Memphis 2, Tenn.

■

Electric Truck for Handling Dies

An electric truck equipped with push-pull device for die placement and removal at racks or flat-bed presses. Handles dies weighing up to 1 ton.

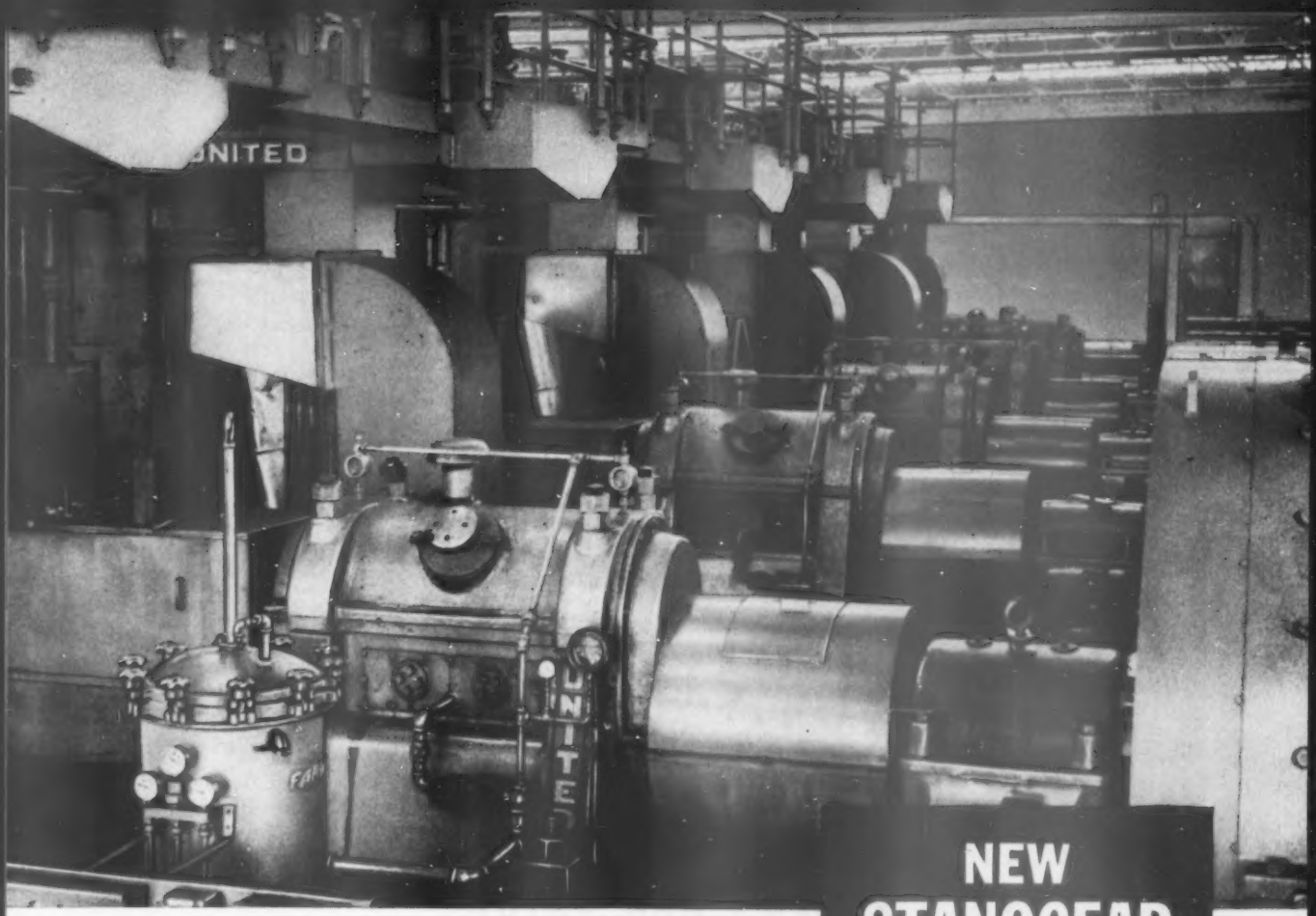
Truck also has an angle winch to load dies in an inclined press. Die-handling platform is a removable plate resting on adjustable forks.

Raymond Corp., Greene, N. Y.

■

AN ENGINE HOUR-METER for use on all lift trucks and tractors is now manufactured by the Towmotor Corp., Cleveland. The instrument can be installed on Towmotor equipment now in use. By recording all phases of vehicle operation, the meter eliminates guesswork in the scheduling of maintenance and periodic service checkups.

Turn the page



NEW STANOGEAR
REG. U. S. PAT. OFF.
Compounds

NOW . . . 7 ways better for extreme-pressure lubrication . . .

New and improved STANOGEAR Compounds have been developed to meet the requirements of an increasing variety of tougher extreme-pressure lubricating jobs found throughout industry, today. The result of several years of special research and field test work, these outstanding products have proved in actual service their ability to provide these important advantages:

1. Higher load carrying capacity. Use of improved extreme-pressure additives in STANOGEAR Compounds provide a greater anti-weld property. This results in the higher load carrying capacity which these products have demonstrated in actual service.

2. Superior retention of load carrying capacity. In service tests, STANOGEAR Compounds have proved superior to conventional extreme-pressure lubricants in ability to maintain a high load carrying capacity over extended periods of service.

3. Freedom from objectionable deposits. Appropriate base stocks and additives give STANOGEAR Compounds a high resistance to oxidation, thus minimize tne formation of deposits.

4. Excellent storage stability. STANOGEAR Compounds contain compounding ingredients which assure excellent stability both in service and storage.

5. Good water separation. STANOGEAR Compounds have demonstrated their superiority to ordinary extreme-pressure lubricants in ability to provide good water separation.

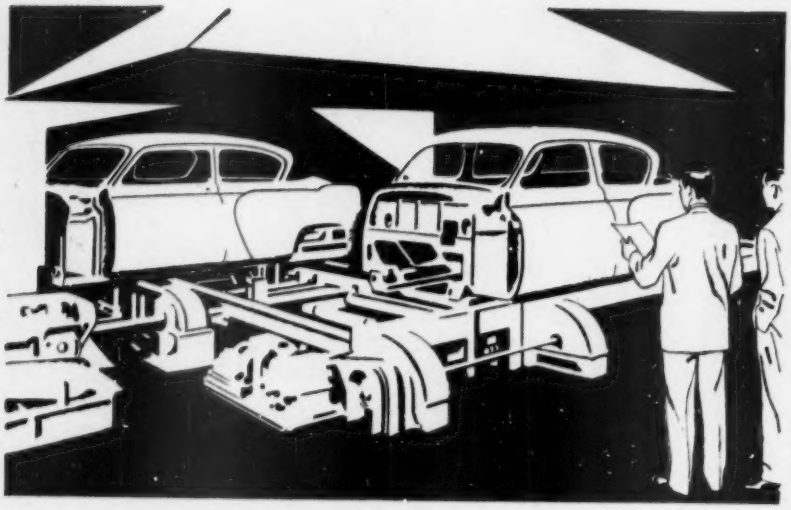
6. Anti-foaming. Under adverse operating conditions, the anti-foam agent in STANOGEAR Compounds has prevented foaming troubles.

7. Versatility. A unique combination of additives in STANOGEAR Compounds equips these products for various industrial gear applications where extreme-pressure lubricating properties are necessary. To meet varying viscosity requirements, STANOGEAR Compounds are available in eight viscosity grades.

The Standard lubrication specialist in your area of the Midwest will be glad to give you more information about the new STANOGEAR Compounds. You need only phone your local Standard Oil office. Or write: Standard Oil Co., 910 South Michigan Avenue, Chicago 80, Illinois

STANDARD OIL COMPANY

STANDARD *(Indiana)*



Automatic transfer: Bodies emerge from final paint line oven, are transferred without handling to conveyor transporting them to body trim.

objective . . .

eliminate all manual handling that doesn't add value to the product

If the operation adds no value to your product, don't waste valuable manpower doing it. Make it a mechanical operation.

Loading and unloading of conveyors, transfer from one conveyor to another and between machines, switching to test stations, repair stations, and storage — manually done they are time and money wasters, automatically done they're time and money savers.

We have designed, engineered, manufactured and installed many of today's most advanced production plants. Some of them are large, some are small. All of them are practical, efficient answers to the competitive necessity of eliminating un-economic handling.

For expert help, call in the MHS engineer!

Mechanical Handling Systems Inc.

MHS

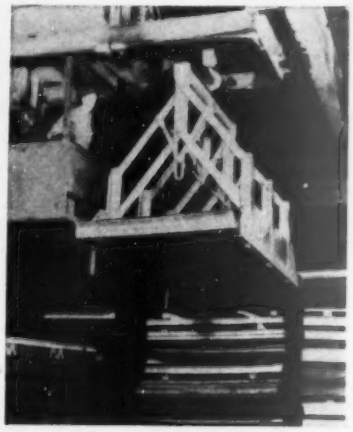
4608 Nancy Ave., Detroit 12, Mich.

Offices in Principal Cities

In Canada: Canadian Mechanical Handling Systems Ltd., Toronto

MATERIALS HANDLING EQUIPMENT

Begins on page 170



Self-Opening and Closing Sheet and Plate Lifter

This automatic sheet and plate lifter lets the crane operator pick up and deposit loads without waiting for men on the ground, the maker says.

In warehousing, only 8-in. space is required between stacks; materials can be tiered to the limit of overhead clearance, maker claims.

Standard model handles 24- to 72-in. widths of steel. Capacity is 6 tons.

Jaeger Machine Co., Dublin Ave., Columbus 16, Ohio.

■

Gravity-Type Liquid Feeder

Controlled gravity-type liquid feeding device that is ideal for batch processes. Called Liquifeeder.

Maintains a constant rate of feed and is adjusted by a valve that meters air into the supply tank. Flow of liquid is not restricted.

Feed can be varied from less than ½ pint to more than 500 gallons per day. Has a combination sight glass and bubble-type flow meter.

Hankinson Corp., 951 Bankville Rd., Pittsburgh 16.

Turn the page

Presto... it's UP!

"WE SAVED 48 MAN-HOURS on the 90 man-hour job of steamcleaning, rewiring and painting an overhead crane at our South San Francisco plant," says Fred Reibin, Plant Engineer, Enterprise Division, General Metals Corp.

25 ft. "UP-RIGHT" SCAFFOLD-ON-WHEELS

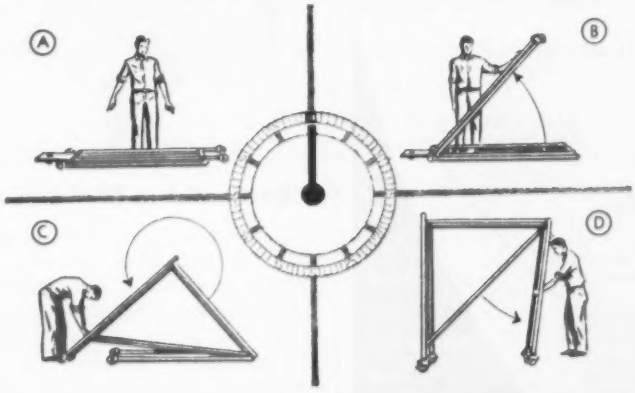
Set up in only 5 minutes!

As if by magic, an aluminum alloy tower of any height desired is ready in minutes! Individual scaffold sections are set one on top of the other. Sections lock into place instantly. The tower rolls down aisles . . . straddles machinery.

HERE'S THE SECRET!...

Patented ONE-PIECE SECTIONS

Each one-piece section is unfolded by one man in less than a minute! No tools, wing nuts or bolts.



Your maintenance costs can be reduced by "UP-RIGHT" SCAFFOLDS

WRITE FOR DESCRIPTIVE CIRCULAR

"UP-RIGHT" SCAFFOLDS
DEPT. 104 · 1013 PARDEE ST. · BERKELEY, CAL.

OFFICES IN ALL PRINCIPAL CITIES

FACTORIES: BERKELEY, CALIFORNIA & TETERBORO, NEW JERSEY

ANOTHER EXAMPLE OF

KELLER Air Tools

for tightening hard-to-reach nuts

KELLER Air Tools
engineered to industry

Some of the toughest jobs in industry suddenly become easy when Keller Ratchet Wrenches go to work. They are the *only* successful power ratchet wrenches ever devised (air OR electric), and they have eliminated some very tiresome jobs.

For instance, on the automobile assembly line shown above, where a Keller Ratchet Wrench is used for attaching the accelerator pedal.

Facts in Brief
about
Keller Ratchet Wrenches

Reaches into close quarters

Light weight and balance

Reduces operator fatigue

Simple operating mechanism

Open-end design fits over hydraulic tubing and piping

Can be used with built-in or detachable sockets

Send for literature and additional information on this unique
POWER
ratchet wrench

Keller Tool Company, Grand Haven, Mich.
Please send me additional information and specifications on the Keller Ratchet Wrench.

Name_____ Title_____

Company_____

Address_____

City_____ Zone___ State_____

MATERIALS HANDLING EQUIPMENT

Begins on page 170

Hydraulic Skid Truck

Hydraulic Skid Truck features a hydraulic platform: Push truck under load, step down on foot pedal, and walk away with the load.

Handles up to 1000 pounds. Easy swiveling action and narrow width permit use in narrow aisles, the maker says.

Steel platform allows truck to be used without skids when desired. Chassis is all-welded.

Ironbound Box & Lumber Co., 42 Hoffman Pl., Hillside, N. J.

■

Retractable Wheel Chock

Made of alloy steel castings, this wheel chock retracts away from the wheel, no matter how tightly the tire wedges against it.

Specially designed gripping surface on rear supports of the chock gives non-slip holding power on any surface, the manufacturer claims.

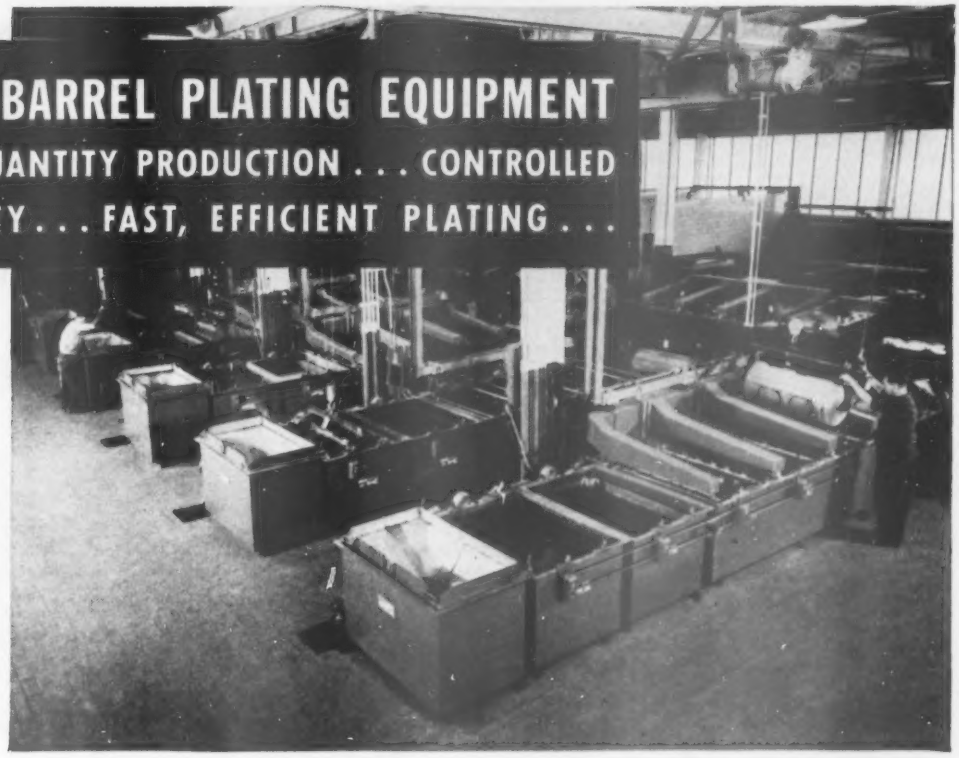
Calument Steel Castings Corp., 1636 Summer St., Hammond, Ind.

Turn the page

UDYLITE BARREL PLATING EQUIPMENT

ASSURES QUANTITY PRODUCTION . . . CONTROLLED UNIFORMITY . . . FAST, EFFICIENT PLATING . . .

at UNION SWITCH AND SIGNAL



Udylite Barrel-Plating Installation at Union Switch and Signal, Swissvale, Pa.

One of the most modern and streamlined electroplating plants in the United States . . . Union Switch and Signal, Swissvale, Pa., a division of Westinghouse Air Brake Company . . . uses automatic barrel-plating equipment by Udylite. With this equipment, they know they'll get the plating results they're after!

Here's what Mr. Albert Beswick, Works Manager, says of Udylite barrel-plating equipment: "Union Switch and Signal and other divisions of Westinghouse Air Brake Company use millions of plated nuts, washers and screws annually. For large-volume handling of these tiny parts, we have found Udylite's barrel-plating equipment to be invaluable from the standpoint of economy and maintenance."

Why not let Udylite help you with your small parts plating problem. Whether it's a single barrel or a multi-barrel installation, Udylite has equipment tailored to your needs!

Call your Udylite Technical Man today or write direct. THE UDYLITE CORPORATION, DETROIT, MICHIGAN. *West of Rockies: L. H. Butcher Company, Los Angeles, California.*

PIONEER OF A BETTER WAY IN PLATING

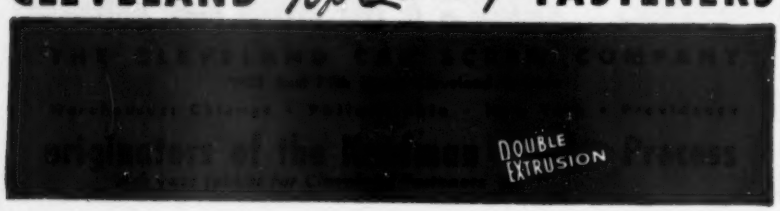
THE *Udylite* CORPORATION
DETROIT 11, MICHIGAN

CLEVELAND *Top Quality*
High Carbon
Heat Treated
Cap Screws

It's easy to select hex head cap screws when you know that *one type,* which costs very little more than the general run, has all the desirable qualities recommended by metallurgists and engineers. Cleveland High Carbon Heat Treated Cap Screws made by the Kaufman Process—the *Double Extrusion* method—"come through" with all the important points experts look for in correctly made fasteners.

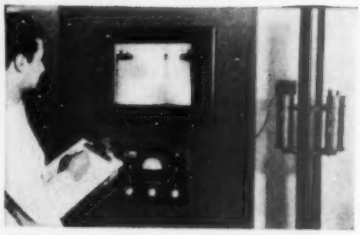
Cleveland specializes in Cap Screws (all standard heads), Set Screws and Milled Studs, in unusually wide size ranges.

CLEVELAND *Top Quality* FASTENERS



WHAT'S NEW IN EQUIPMENT
Begins on page 140

MEASURING & CONTROL



Meters Specific Gravity Continuously

This instrument uses radioactivity to measure specific gravity of material at operating temperatures and pressures. Generally it makes no direct contact with process material and doesn't interfere with the process. Can be used for liquids, slurries, sludges, or granular materials, the maker says.

Fits on 3- to 6-in. pipes with externally mounted brackets. Cable connects the measuring cell to the amplifier, which can be 200 feet away.

All components are of dust- and weather-proof construction. No high-voltage power supply or special piping is needed.

The Ohmart Corp., 2347 Ferguson Rd., Cincinnati 38

■

Temperature Control Unit

Designed for accurate temperature control of molds, dies, printing rollers, and similar equipment. Although primarily a permanent installation, the temperature control unit can be adapted to portable service.

Dual arrangement offers two independent heating, cooling, and circulating systems.

Sterling, Inc., 3738 N. Holton St., Milwaukee

Turn the page

FLEX-A-POWER

Busway Distribution Systems

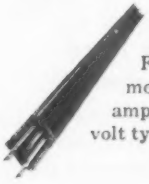
FLEX-A-POWER means permanent modernity of a building's electrical distribution system — complete freedom to change layout, add or move equipment, rearrange circuits and make building additions at minimum cost. Hundreds of modern plants have adopted it.

Now *Aluminum* Flex-A-Power gives you all the advantages of copper Flex-A-Power, including low voltage drop, *with up to 35% less weight.*

This means easier handling and installation, less expensive hanging, lighter floor loading.

Now the margin of Flex-A-Power superiority is greater than ever. Your Trumbull Distributor, working with Trumbull engineering, can give you authoritative information, prompt quotations and speedy delivery. Call him, or write us for Bulletin TEC-21.

Quick Facts ABOUT ALUMINUM FLEX-A-POWER



***TYPE FVK.** A plug-in busway with power outlets at one-foot intervals, tapped by Flex-A-Plugs of the fusible switch or molded case circuit breaker types. 225-800 amperes, to 600 volts. (3-phase 4-wire 277/480 volt type available in 225 and 400 ampere ratings.)

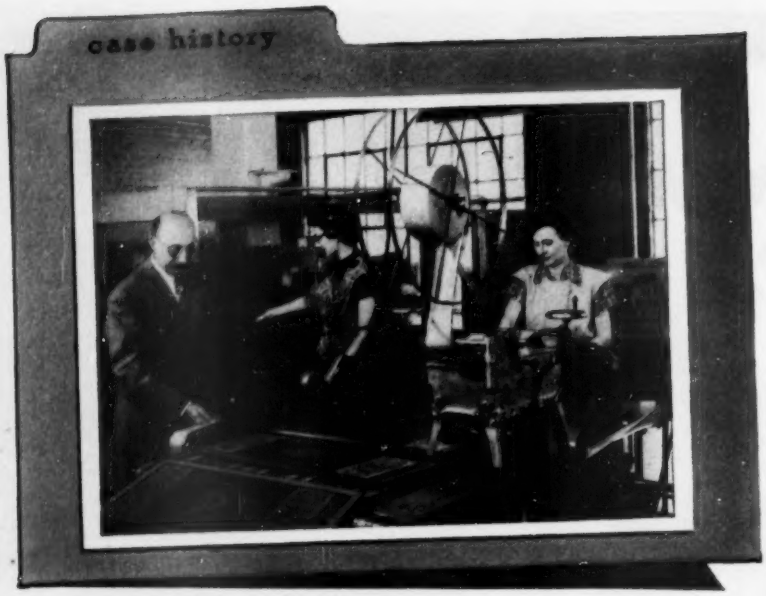
***TYPE LVD.** For high capacity, low voltage drop, feeder applications, or as a riser in multi-story buildings carrying high currents over long distances, 600-4000 ampere ratings, to 600 volts.

*Also available with copper bus bars. Light- and heavy-duty trolley busways available with copper bus bars only.

Listed by Underwriters' Laboratories, Inc.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.



"Blue Ribbon tape is saving us hundreds of dollars"

...says Victor Mfg. & Gasket Co.

world's largest gasket manufacturer

Victor Mfg. & Gasket Co. recently designed automatic taping machines to seal their shipping containers. During the experimental period, Victor tested many brands of tape. Merchandising Manager A. J. Lukes, Jr., reports:

"Blue Ribbon Superstandard Gummed Tape is our choice. Its strong kraft enables us to save money by reducing the basic weight of the tape, thus getting extra footage of tape for the same money. Its fast-acting adhesive eliminates the high cost of wetting agents previously required. As a result Blue Ribbon is saving us hundreds of dollars a year.

"Blue Ribbon moistens instantly and grips securely under only momentary pressure. This makes it ideal for both our automatic and manual sealing operations."

Victor's merchandise travels in spotless condition. Yours can, too, if—like Victor—you use Gummed Tape. Only with Gummed Tape do you *seal* exposed seams and corners, so that not even a crack remains. Smoke, dust, moisture, or vermin can't find an opening. Gummed Tape is the only closure that does so much for so little.

SEND FOR FREE BOOKLET

CONSISTENTLY SUPERIOR

Blue Ribbon SUPERSTANDARD GUMMED TAPE

another product by

HUDSON PULP & PAPER CORP.

Dept. 411, 505 Park Ave., New York 22, N.Y.

HUDSON PULP & PAPER CORP.
Dept. 411, 505 Park Ave., New York 22, N.Y.

Send without obligation my copy of your helpful booklet, "How to cut costs in your shipping room."

NAME_____

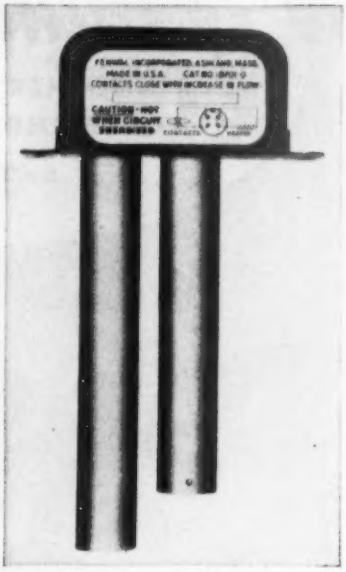
COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

MEASURING & CONTROL EQUIPMENT

Begins on page 180



Air-Flow Detector

Detect-A-Flo is a flow-detecting instrument that senses and responds to changes or stoppages in the flow of air. Viscous liquids have little or no effect on this unit, the maker claims.

Easy to install and practically foolproof in operation. Can be used as a warning device in air-cooled equipment, a ventilation control, and for similar applications where a particular flow rate must be maintained.

Weighs only 8 ounces. Control can handle 5 amperes at 115 volts a-c or 2 amperes at 28 volts d-c.

Fenwal Inc., Ashland, Mass.

■

Instrument Ink Feed With 8-Day Capacity

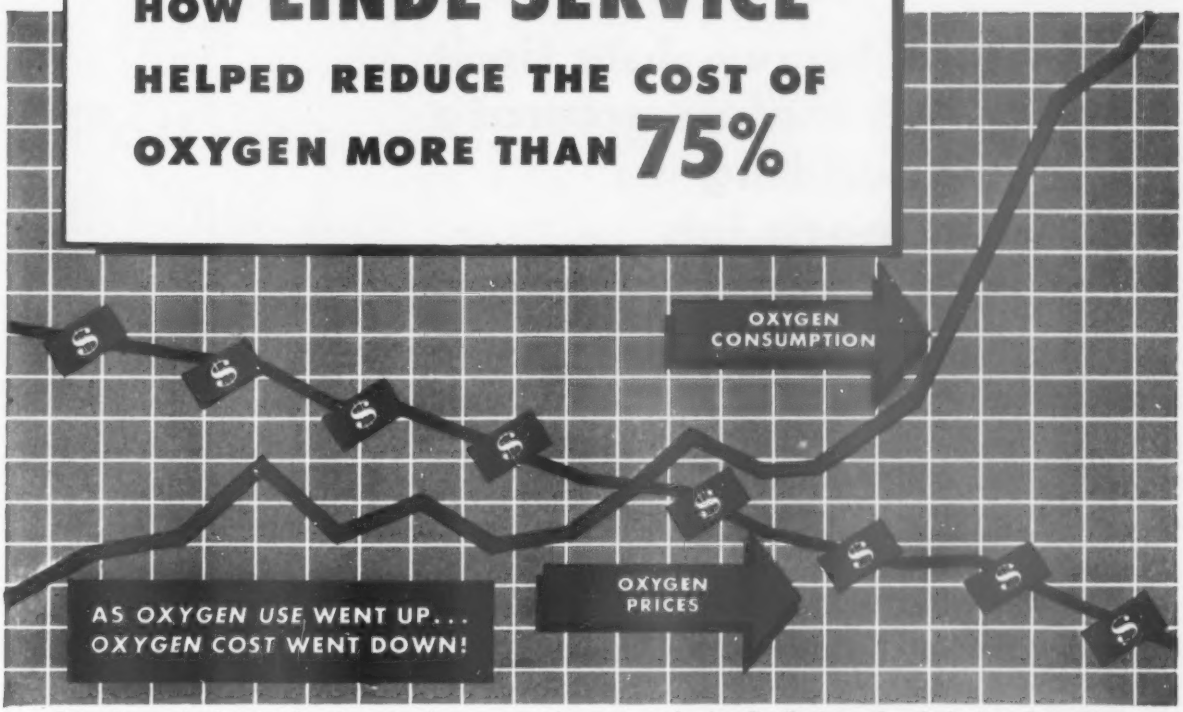
Made of lightweight plastic, this ink feed has a reservoir that holds an 8-day supply of regular instrument meter ink.

It can be quickly attached to all makes of instrument pens with plastic bands.

John P. Squier Co., P. O. Box 6100, Dallas, Tex.

Turn the page

HOW LINDE SERVICE* HELPED REDUCE THE COST OF OXYGEN MORE THAN 75%



LINDE SERVICE has brought about important improvements in oxygen production, distribution, and methods of use. In profiting by these improvements, LINDE customers have increased their use of oxygen per ingot-ton of steel produced more than 12 times in 25 years. This increased volume of usage in turn enabled LINDE to reduce the cost of oxygen more than 75% in that time.

With LINDE Oxygen you get *all* these important advantages—

- **DEPENDABILITY OF SUPPLY** —— No oxygen shortage due to failure of a single plant. Many strategically located plants to meet every demand.
- **FLEXIBILITY OF SUPPLY** —— No fixed capacities. You get what you need when you need it . . . and pay only for what you use.
- **LOW UTILIZATION COST** —— No capital investment . . . no costly maintenance.

PLUS . . . LINDE SERVICE—

The unique combination of research, engineering, and over 40 years of accumulated know-how that is helping LINDE customers save money and improve production in their uses of oxygen and oxy-acetylene processes.

If your company uses oxygen, LINDE SERVICE *can mean dollar savings to you. Let us tell you more about it.*

LINDE AIR PRODUCTS COMPANY

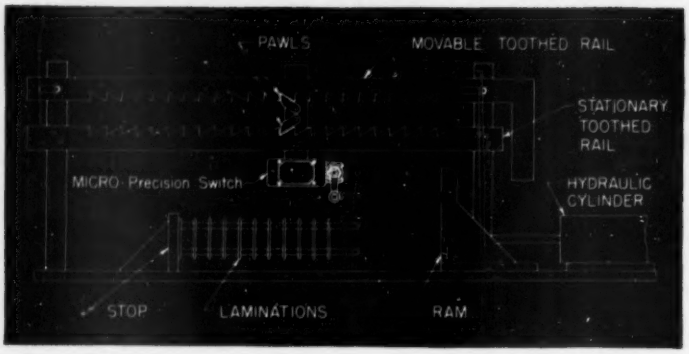
A Division of UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

MICRO heavy duty limit switch makes accurate coil building an automatic job



• Spacing of laminations is done automatically on this coil building machine by use of a MICRO heavy duty limit switch.

1 The ram pushes laminations on tubes until contact is made with the limit switch.

2 When the switch is operated it trips a four-way solenoid valve which reverses the flow of oil in a hydraulic valve, forcing the ram to return.

3 When the ram reaches the end of its return travel, an arm on the ram causes the switch assembly to move back one notch . . . ready for the next operation.

This is another of the thousands of uses plant engineers and maintenance men are making of MICRO switches as limits, safeties and interlocks on every type of plant equipment. It is easy to make machinery safer and more productive through the use of MICRO switches. There is an authorized MICRO distributor near you with a wide variety of switches to meet your specific needs. Look in your classified telephone directory under "Switches, Electric."

MICRO
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS
A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

PLANT HOUSEKEEPING & SANITATION

Fog Applicator for Indoor Use

Portable electrically-driven insecticide fogging unit is designed especially for indoor use. It will create no fire hazards.

The unit converts a liquid solution into a fog-like emission. This fog penetrates every nook and cranny.

Operates on 110-volts a-c. Has been approved by the Underwriters' Laboratories.

Todd Shipyard Corp., Elmhurst, L. I., N. Y.

■

Triple-Function Floor Maintainer

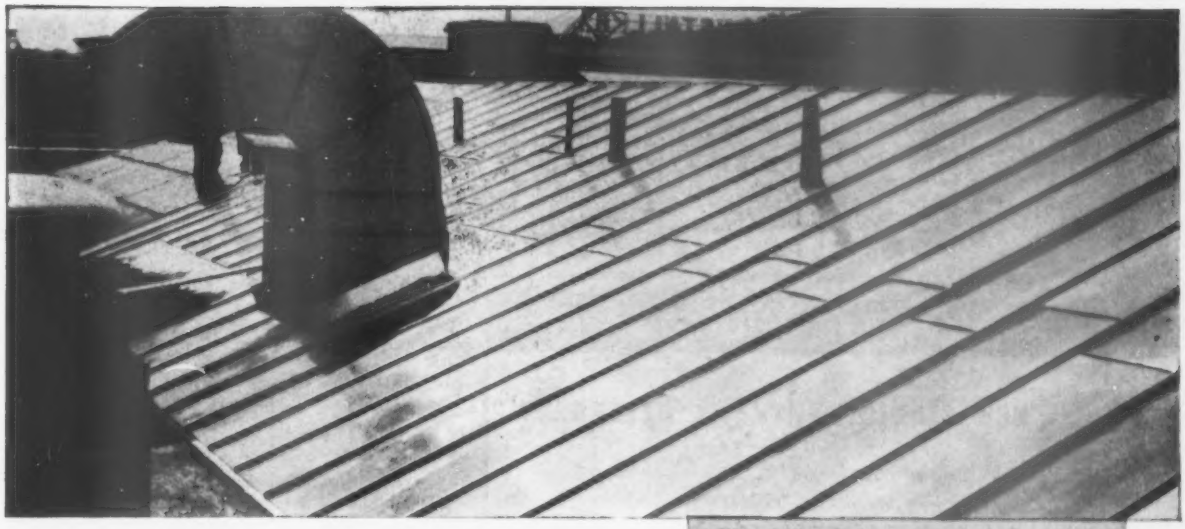
A vacuum-polisher cleans, vacuums, and polishes floor in one operation without raising dust.

Does away with mop, wringer, and bucket. It is made for constant use.

Twin brushes rotating at 800 rpm. together with a powerful vacuum perform the cleaning operations. Cleans all types of floors.

Columbus-Dixon, Inc., 333 E. 23rd St., New York 10.

Turn the page



Another LONG-LIFE, LOW-COST, LIGHT-WEIGHT ROOF OF U·S·S 17 (TYPE 430) Stainless Steel

U·S·S 17 (Type 430) Stainless Steel is today's big news in the field of industrial construction. Recent months have seen a steadily increasing use of this long-lasting, maintenance-free, light-weight material that offers an unbeatably low cost per year.

A typical example is the new office structure of The Heppenstall Company in Pittsburgh, Pa. Two existing buildings and the space between were enclosed to form a new structure 86′ x 100′ and U·S·S 17 Stainless Steel was used for the roof, the flashing and the parapet. The walls, too, are straight-chromium Stainless Steel.

For any building that must go up to stay up, U·S·S 17 Stainless Steel is one of the most economical materials available today for walls and roofs. It will give you a service life several times that of less durable materials . . . free from recurring maintenance charges . . . free from painting. The corrosion resistance of this straight-chromium grade of Stainless has been proved in installations more than a quarter of a century old.

Strong, corrosion-resistant Stainless Steel can be used in lighter gages than other materials. Wall and roof panels can be installed quickly and easily.

Straight-chromium grades of Stainless Steel are in unrestricted supply today. If you are planning a new building, get all the facts on this long-lasting material now. Mail the coupon for our free booklet.

Roof panels of 24 gage straight-chromium Stainless Steel were used on this building of The Heppenstall Company, Pittsburgh, Pa. Fabrication and erection was done by Limbach Company, Pittsburgh.

The parapet, roof flashing and gutters of the building are also straight-chromium Stainless Steel.

Straight-chromium Stainless Steel was also used for the wall panels that enclose the new office structure of The Heppenstall Company.

USS

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

United States Steel Corporation
Room 2813-Z, 525 William Penn Place
Pittsburgh 30, Pa.

☐ Please send me your booklet, "U·S·S 12, U·S·S 17 Stainless Steel Walls and Roofs for Industrial Buildings."

☐ Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.

Name .....Title .....

Address .....

City .....State .....

UNITED STATES STEEL

LIFTS DIRT FROM FLOORS...
HOLDS IT OFF...

CINDET

100% ACTIVE — 100% SAFE!

NEW LIQUID SYNTHETIC DETERGENT

Whether your water supply is HARD or SOFT, cleaning with CINDET means *no curds, no dingy film!* CINDET is *surface-active*—it works on the principle of LIFTING floor dirt, grease and old water-emulsion wax from floors and HOLDING it in suspension in a fluffy mass of energetically-cleaning SUDS. *Dirt is not redeposited*—rinses off easily.

Dilute a little CINDET in HARD or SOFT water . . . apply with clean mop . . . let foamy, clean-looking suds stand 5 or 10 minutes . . . scrub only if necessary, and rinse thoroughly. The result: AMAZINGLY BRIGHT, CLEAN FLOORING.

Safe for *all* flooring—and wonderful for removing stubborn rubber marks. Also excellent for walls, for shampooing rugs and upholstering, for washing dishes by hand.

DOLGE backs up CINDET with a complete-satisfaction-or-deal-is-off GUARANTEE! Write for literature; have your DOLGE SERVICE MAN demonstrate CINDET on *your dirtiest, greasiest flooring.*

...THE SUDS DO THE WORK!

FOR FREE SANITARY SURVEY of your premises consult your DOLGE SERVICE MAN

dependable DOLGE

WESTPORT, CONNECTICUT

PLANT HOUSEKEEPING & SANITATION

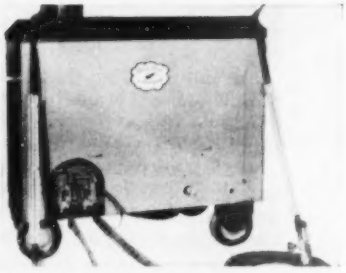
Begins on page 184

Springboard Mats With Rubber Cushions

These springboard floor mats have a rubber-cushioned foot that insulates and prevents slippage even on wet or smooth surfaces, the maker claims. Mats can be tailored to fit around machines and counters. Made of seasoned oak and non-rusting steel wire, with nailless construction.

Southern Manufacturing Co., 1814 DeSiard St., Monroe, La.

■



Steam Cleaner With Two Guns

Designed for heavy-duty, this steam cleaner delivers 200 gallons of combined saturated steam and cleaning detergent per hour.

The spray has a pressure of 130 pounds. This blasts away dirt, grease, and other objectional matter. Generates steam from cold water in only two minutes.

Quick Charge, Inc., 1750 N. E. 10th St., Oklahoma City.

Turn the page

NOW

HY-TEST

guarantees its exclusive

BolTan

sweat-resistant leather insoles

GUARANTEE

We guarantee that the Bolton Sweat Resistant Leather Insole built into our Work Shoes will not deteriorate from perspiration conditions... or a new pair of shoes will be supplied Free and the full purchase price of your original purchase will be refunded.

INTERNATIONAL SHOE COMPANY

Twice the wear
lowers cost per pair

WHAT A WORLD OF DIFFERENCE 7 MONTHS CAN MAKE

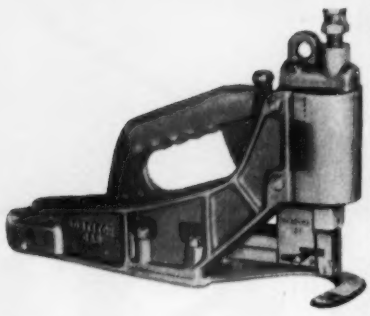
BolTan still soft and pliable

ORDINARY LEATHER INSOLE, curled, cracked, and saw-edged.

HY-TEST SAFETY SHOES

HY-TEST SAFETY SHOES

A QUIZ ABOUT THE NEWEST BOSTITCH PROFIT-CLINCHERS



1 How can a squeeze of your finger seal overlapping flaps of tough fiber containers?

2 What is the newest, surest, quickest, cheapest method of sealing small shipping containers?

3 How can you clinch staples in soft materials without a blade or clincher under the work?

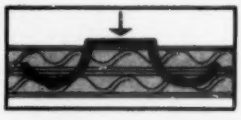
The Bostitch Line includes more than 800 profit-clinching machines—one to fit almost any fastening need. Staplers for production lines, shipping rooms, offices. Let your local Bostitch man demonstrate them to you. He's under "Bostitch" in your telephone directory.

ANSWERS:

1 This powerful new Bostitch Air Drive Stapler with "C" blade—Model C67AD—is ideal for the job. Drives heavy-duty staples through tough materials, easily and rapidly. It's a whiz with large, awkwardly shaped containers!

2 Stapling, of course, with the handy new Bostitch P6P Stapling Plier. Its pointed blade makes only a tiny slit to insert the clincher for stapling flaps of small corrugated containers, and lids of all sizes.

3 The Bostitch T5 Tacker *with Outward Clinch* spreads staple legs inside or under the work, entirely from the outside. No blade or clincher needed. Used for fastening insulation around ducts, tags to corrugated containers, many other jobs that could not be stapled any other way, etc.



BOSTITCH, *608 Mechanic Street, Westerly, R. I.*

Please send me information about fastening (*check materials*) . . .

☐ Wood ☐ Paper ☐ Rubber ☐ Fabric
☐ Plastics ☐ Leather ☐ Light Metals ☐ Roofing

We are presently using (*please check*) . . .

☐ Nails ☐ Glue ☐ Tape ☐ Tacks
☐ Pins ☐ Thread ☐ Rivets ☐ Spot Welds

Name _____

Company _____

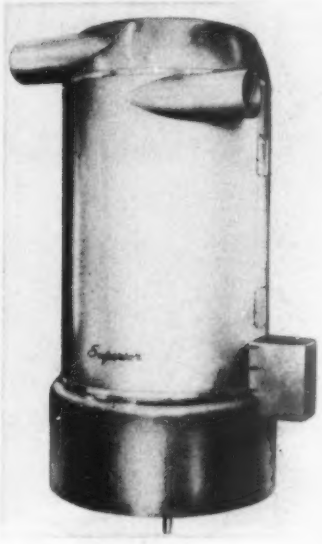
Address _____

City _____ *Zone* _____ *State* _____

BOSTITCH® fastens it better, AND FASTER with wire

PLANT HOUSEKEEPING & SANITATION

Begins on page 184



Air Cleaner Removes Dust

This machine is designed for continuous dust removal and particle recovery from air and gas. Operates on a new impelled centrifuge principle.

Adaptable to plant air-flow systems where processes involve machines such as grinders, dryers, mixers, and many others. Will operate in a variety of temperature and humidity conditions.

Stands 7 feet high and is 42 inches in diameter. Made of steel, with only one moving part.

Superior Separator Co., 2310 Stevens Ave. S., Minneapolis.

■

Water Filter for Smaller Plants

With this filter you can use lake, well, or river water as industrial plant water supply with safety, the maker says.

Employs diatomite filtering. Will completely remove either colloidal or solid, suspended matter, manufacturer claims.

Sparkler Manufacturing Co., Mundelein, Ill.

Turn the page

Fast... Efficient Materials-Handling *with* Colson® Casters

● The casters pictured here are only three of the nearly 1500 different types manufactured by COLSON to meet every industrial materials-handling requirements—*exactly.*

Old, bumpy, hard-to-handle equipment can easily be restored to its original efficiency with a saving of time and money.

Other cost-cutting materials-handling equipment by COLSON includes hand trucks, barrel and drum trucks, platform trucks and Lift-Jack systems. Write us or consult the yellow pages of your phone book (under "casters" or "trucks, industrial") for the COLSON office near you.

Mail this Coupon today →

THE COLSON CORPORATION
ELYRIA, OHIO
CASTERS • LIFT-JACK SYSTEMS • INDUSTRIAL TRUCKS

THE COLSON CORPORATION
ELYRIA, OHIO

Please send my free copy of the new COLSON Catalog.

Name_____
Position_____
Company_____
Address_____
City_____
Zone_____ State_____

CALL ON THE "Specialists" FOR ACCURATE METERING

1,000,000 cfh—One R-C Positive Displacement Meter to measure large volumes saves foundation costs and possible loss of production space.
4,000 cfh—especially valuable for metering purchased or sold gas, or for proportioning and departmental cost accounting.

The successful performance of Roots-Connersville Positive Displacement Meters has long been proved by large and small industrial plants and public utilities. These users rate them high in such basic essentials as:

Accuracy—not affected by pressure, wide ranges in loads or other variables. Absence of valves, vanes and other small parts insures "cash register" accuracy over years of use.

Capacity—from 4,000 cfh to 1,000,000 cfh in one unit, with ample ability to absorb overloads.

Compactness—smallest made for industrial use in foot-for-foot of capacity. Can be located in otherwise unusable space, thus saving production areas.

Almost a century of experience in handling gas and air, exclusively, goes into the design and construction of R-C Meters. They're part of the comprehensive line of blowers, exhausters, gas and vacuum pumps and related equipment, which are the products of R-C Specialists, and which are in widest use in industry.

A new bulletin, M-152, gives complete data on R-C Meters, including a handy selection table which simplifies your choice of the right meter to suit your specific application. Your copy will be sent on request.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER A DIVISION OF DRESSER INDUSTRIES, INC. 535 Central Ave. • Connersville, Indiana

SAFETY & PLANT PROTECTION

Easy-to-Install Fire Extinguisher

Here's a device for automatic fire protection. You just hang it from the ceiling on a bracket. No piping or alarm system is required.

When temperature hits 165 F., the extinguisher goes off automatically. The extinguishing agent (carbon tetrachloride) is released as a vapor and settles over the fire like a blanket.

Standard Safety Products Co., P.O. Box 2111, Lansing, Mich.

■

SAFETY SHOES FOR STRAIGHT AND EXTENSION LADDERS made of aluminum have been marketed by the Aluminum Ladder Co., Worthington, Pa. Can be used around fuels and other volatile fluids because they will not throw a spark. Available for use with almost any metal or wooden ladder.

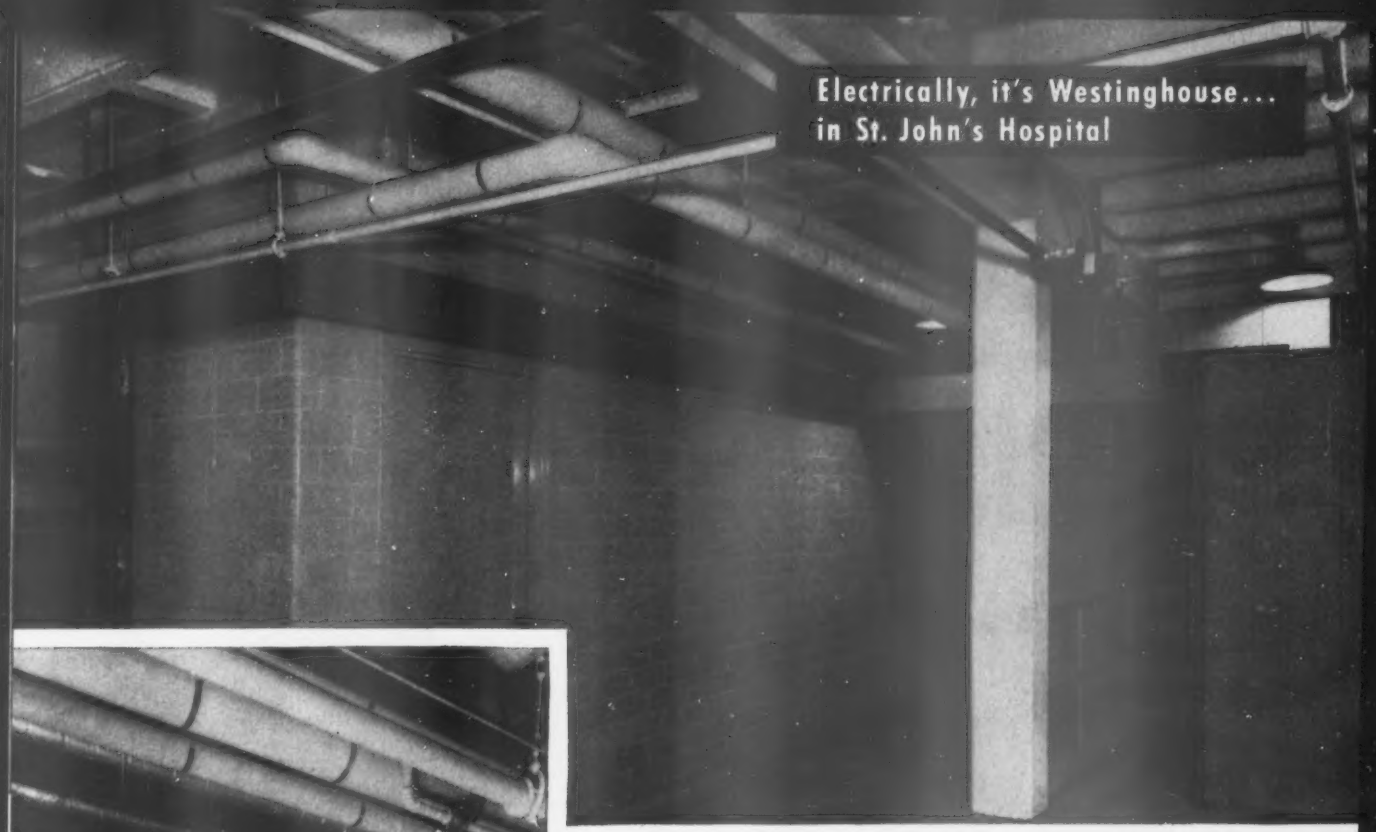
■

FOG NOZZLE TO FIGHT INDUSTRIAL FIRES has been developed by the Akron Brass Mfg. Co., Wooster, Ohio. Made for 1½-in. hose. Use of vapor prevents disastrous water damage to plant equipment caused by a heavy solid stream of water.

■

SINGLE-CARTRIDGE RESPIRATOR is designed to protect wearer against nuisance concentrations of organic vapors and certain acid gases. The maker, Mine Safety Appliances Co., Pittsburgh, Pa., says that economy and comfort are features.

Turn the page



Power for the boilerhouse! Here, 600-ampere duct feeds the 300-kva sub-power center in the boilerhouse. Note how duct hugs the wall. This run is over 400 ft. long.

Tee for two! Here an 800-ampere main feeder connects with two 600-amp branch feeders. Tee is one of several standard units. Note circuit breaker cubicles for overload protection.

Bus duct minimized power loss, matched perfectly with building plans

The choice of Westinghouse Bus Duct to carry power in St. John's Hospital, Springfield, Missouri, was highly suitable to the client, the architect and the contractor.

Of prime concern was the possible power loss in carrying 480 volts the considerable distances between the main and sub-power centers. Bus duct minimized this loss, assuring distribution economy.

Bus duct matched perfectly with building plans. Standard lengths, elbows and tees, plus specially fabricated sections, made it easy to fit the runs into the structure, around obstructions.

Installation was fast, simple. Pre-assembled in advance of the installing crew, sections bolted together easily; were swiftly mounted with sliding cantilever and "C" type hangers.

These advantages, plus reliability, reduced maintenance and flexibility to handle additional loads without expensive rewiring, make Westinghouse Bus Duct ideal for institutional, commercial and industrial buildings. For full details, see your Westinghouse Representative, or write for B-5835, Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pennsylvania.

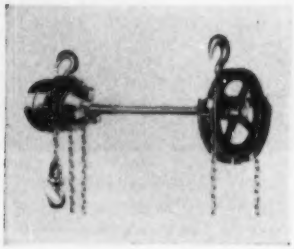
J-30159-A

YOU CAN BE SURE...IF IT'S

Westinghouse

ASK YOUR DISTRIBUTOR FOR

CHESTER HOISTS



Chester Spur-Geared Chain Hoists, ¼ to 25 ton . . . and many special types including the Extended Handwheel and Low Headroom.

→ BECAUSE THEY'RE DURABLE

. . . from hook to hook. Chester Hoists are built for a steady job of lifting, and built to last with quality castings and forged parts, and with Timken Tapered Bearings for smoother operation and longer wear.

→ BECAUSE THEY'RE DEPENDABLE

. . . Chester Hoists are expertly designed and ruggedly constructed to deliver high mechanical efficiency in everyday lifting. They're actually built to a safety factor of 5 times the rated load, to protect your men and equipment.

→ BECAUSE THEY'RE ECONOMICAL

. . . ease of maintenance is an outstanding feature of Chester Hoists. With Timken instead of ordinary bearings, they can be much more readily torn down and reassembled . . . serviced on the spot in a matter of minutes with ordinary tools.

→ BECAUSE THEY'RE SPEED-SERVICED

. . . any Chester Hoist part can be quickly supplied as needed. When your hoist requires factory overhaul and testing, it will be done quickly and completely, and the hoist will be rushed right back to work for you.

Ask your distributor, or write us, for complete catalog, and tell us your requirements.

CHESTER HOIST DIVISION

The National Screw & Mfg. Company, Lisbon, Ohio

National

FASTENERS HODELL CHAINS CHESTER HOISTS

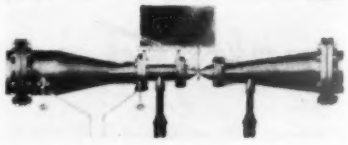
VALVES & FITTINGS

Highly Flexible Coolant Tube

This coolant tube, made of Neoprene, can be twisted into almost any shape. And it remains twisted until re-shaped.

Copper core keeps tube from sagging, drooping, or wandering out of position.

Acrobat Co., 1923 Vineyard, Los Angeles 16.



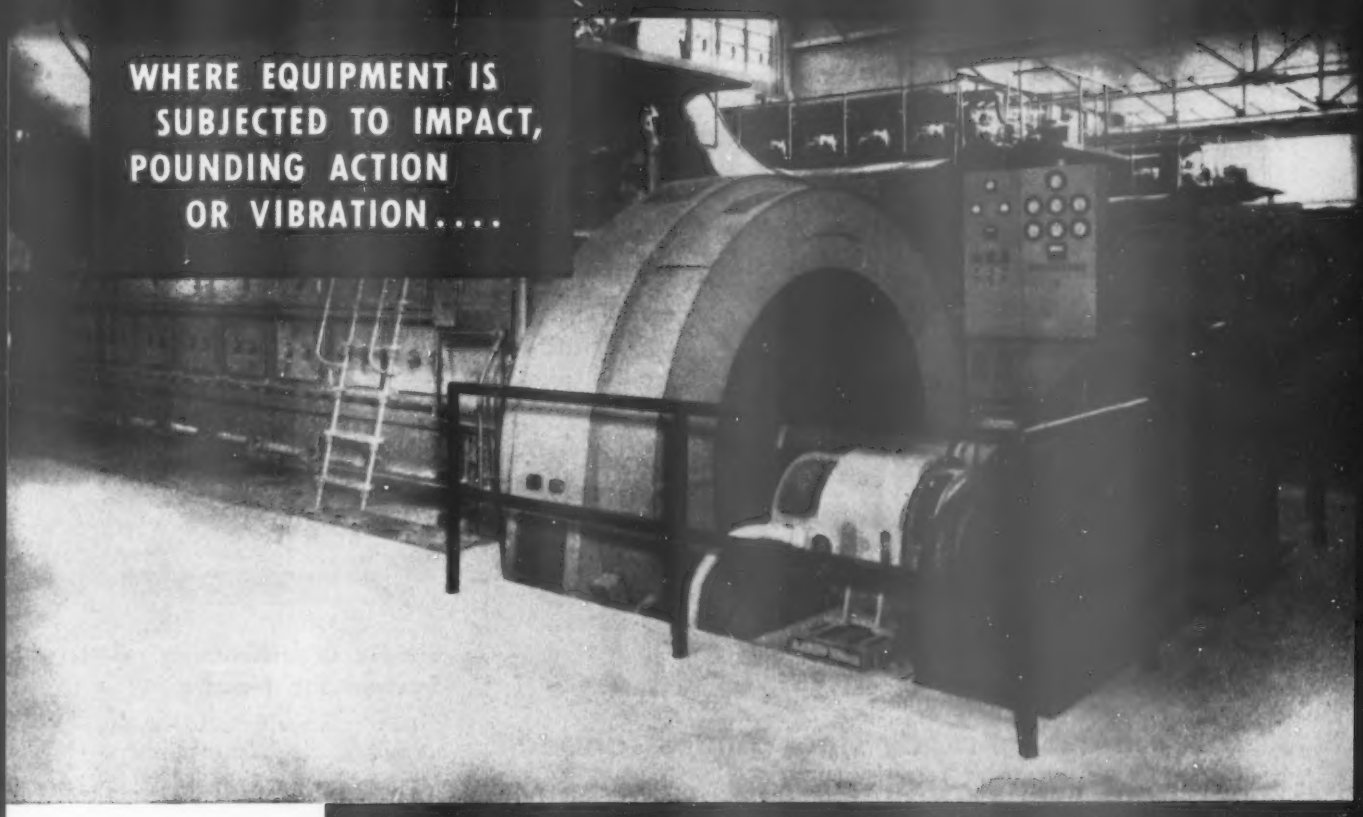
Sludge Controller

Squeeze controller, 8 inches in diameter, regulates sludge or heavily laden liquid flow. Overcomes most of the difficulties in flow regulation, maker claims.

Flexible rubber section has no pockets to trap particles of materials. Differential pressure in the venturi tube is transmitted to a rate setter which measures and maintains the desired flow.

Simplex Valve & Meter Co., 68th and Upland Sts., Philadelphia.

Turn the page



Johnson Station of Wolverine Electric Cooperative, Hersey, Michigan. Archt. & Engr. — J. & G. Daverman Co., Contr. — Strom Construction Co. — both of Grand Rapids, Michigan. Engines grouted with Embeco; floors are tile red Masterplate.

EMBECO produces non-shrink, long life Grout.... helps avoid costly shutdowns

To avoid shrinkage — principal cause of failure in equipment grouts — plant engineers use Embeco*, the material that produces a *flowable grout which does not shrink.*

Whether it's engines, large machine tools, hydraulic presses, rolling mills, pulverizers, forging machines, mould shake-outs or other equipment subjected to impact, pounding action or vibration, Embeco will produce a grout that gives long and satisfactory service. Many leading equipment manufacturers and erectors recommend the use of Embeco.

In addition to counteracting shrinkage, Embeco produces easy placeability . . . sets in 6-12 hours . . . gives 7-day strength in 24 hours; 50% greater ultimate strength . . . insures full, level bedplate contact . . . maintains alignment . . . provides ductility.

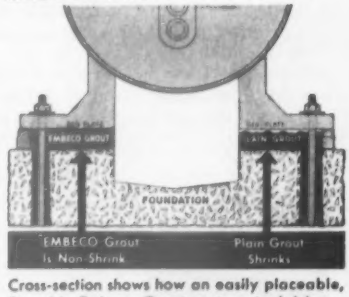
• • •

The Masterplate "iron-clad" concrete floor, illustrated at right, is produced at the time floor is installed or resurfaced. It has 4-6 times greater wear-resistance, is non-dusting, spark-safe and easy-to-clean. Non-colored and colored.

Full information on Embeco and Masterplate and "see-for-yourself" Masterplate demonstration kit supplied on request.

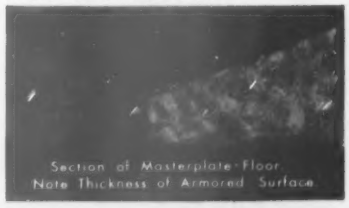
*Embeco is a combination of specially graded metallic aggregate combined with Master Builders cement-dispersing, water-reducing agent, calcium lignosulfonate, and ammonia free oxidizing agents.

EMBECO . . .



Cross-section shows how an easily placeable, flowable Embeco Grout conteracts shrinkage to produce full contact with bedplate.

MASTERPLATE . . .



Section of Masterplate Floor
Note Thickness of Armored Surface

the MASTER BUILDERS Co.

Subsidiary of American-Marietta Company

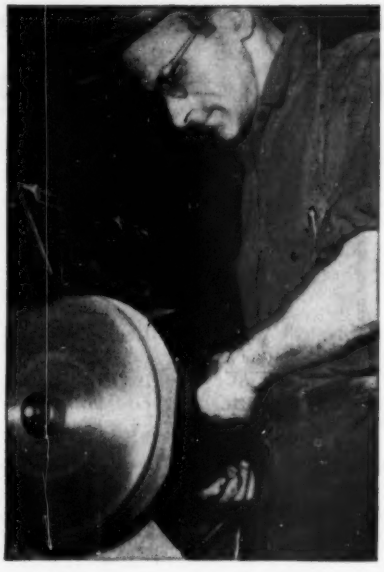
Backstand Belts Triple Production!

Three times as many steel guides sanded per hour using ARMOUR Backstand Belts!

In sanding beveled edges of a steel guide for vending machines, a prominent company* decided to use backstand belts instead of set-up wheels. The switch *increased production from ten to thirty guides per hour!* Here is more proof that Armour backstand belts are more efficient, more economical than set-up wheels.

Belts are only one of the many forms of coated abrasives available to you from Armour. There are more than 30,000 different varieties in grit size, backing, etc. We have sheets, discs, rolls, tubes—and specialty sizes to meet your specifications. Your industrial supply distributor will be glad to tell you about this complete Armour line. Call him today!

Mail the coupon below for your free copy of our useful booklet, "Backstand-Belt Polishing."



*Name of company available on request.

We recommend buying through your industrial distributor.

ARMOUR

MAIL THIS COUPON TODAY!

Armour and Company • North Benton Road • Alliance, O.

Please send me the free booklet, "Backstand-Belt Polishing."

Name..... *Title*.....

Firm.....

Address.....

City..... *Zone* *State*..... F

VALVES & FITTINGS

Begins on page 192

Simple Identification System for Pipes

Here's an easily installed pipe identification system requiring no protective coating, cleaning, or maintenance. It uses labels custom-made of Vinylite plastic sheet.

Changes in temperature, humidity, and corrosive conditions have little effect on the plastic labels, the maker says.

The labels spring closed over the pipe. They are colored and worded to suit requirements. Available to fit any size pipe up to 30 inches in diameter.

Wilmington Plastics, Inc., 810 S. Heald St., Wilmington, Del.

■

Safety Valve for Metal Drums

Valve is designed to control and prevent explosions in 50-gal. metal drums containing flammable liquids. Regulates pressure inside the drum, which is the cause of many explosions.

Can easily be screwed into the bung hole by hand. It is called Vent-A-Drum and contains 23 functioning parts. Each part is set in place and needs no adjustment or replacement, the maker says.

Weighs less than 2 pounds and is about 3½ inches high.

Central Safety Equipment Co., 2201 E. Huntington St., Philadelphia 25.

Turn the page

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

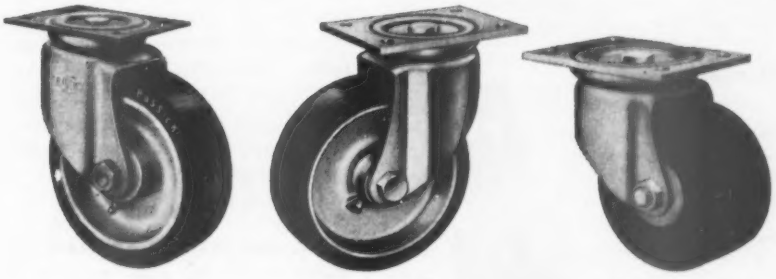
Are WALLFLOWER trucks costing you money?

If you're looking for ways to cut operating costs (and who isn't?), here's one that's often overlooked.

Check your rolling stock—dollies, hand trucks, portable equipment, etc.—and see whether you haven't got a few "wallflowers" that nobody wants to use. You'd be surprised how often equipment that seems to be in good shape stands on the sidelines because inefficient casters make them unpopular with workmen. Since they're hard to move, they get the cold shoulder in favor of equipment that rolls easily and smoothly. And it's no news that idle equipment wastes money fast.

You can make the "wallflowers" carry their full share of the load simply by equipping them with efficient Bassick casters. Why not try Bassick casters on one of your idle trucks? Then watch how quickly it goes to work for you.

Put them back in ACTION with these Bassick Casters

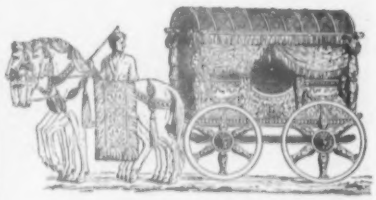


SERIES "L99" SERIES "H99" SERIES "S99"

These rugged Bassick truck casters make any floor an "Easy Street" for portable equipment. Built to give easier handling and longer life, they come in sizes from 3″ to 10″, with all types of wheels, have fully hardened raceways.

There's a Bassick industrial caster distributor in your neighborhood who stocks the right size and type of caster for anything from teatables to ten-ton trucks.

Why Roman roads are arrow-straight



Engineers who marvel at the enduring construction of the old Roman roads sometimes conclude that they're straight as an arrow because that's the best way to build military vehicular highways in a hurry. Some historians offer another explanation. They think these roads are straight because the Romans hadn't discovered the trick of swiveling the wheels of their 4-wheeled carts. Naturally these had a hard time getting around corners, while the famous Roman chariots simply skidded around on their two wheels.

This may also explain why the Romans built so many 2-wheeled state coaches when you'd expect them to have four wheels. An exception is the ornate carriage shown above, which is of uncertain date.

Good casters do not need straight roads. They provide the flexibility so important in materials handling to move any equipment immediately in any direction. Put your loads on Bassick Casters and save precious time and labor. Bassick has the right caster for the job.

THE BASSICK COMPANY
Bridgeport 2, Conn.

In Canada:
Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER

...Then ALGRIP Banished Slipping Accidents and Pared the Company's High Insurance Rates!

ELIMINATED: Crippling accidents that slashed production.

SAVED: Lost man-hours and high insurance premiums.

Take a machine tool, surround it with oil-filmed flooring, and you've set the stage for a tragedy. This one—in a southern industrial plant—cost a skilled workman his arm.

Then we installed A.W. ALGRIP Abrasive Rolled Steel Floor Plate. Result: No more slipping accidents! For tough abrasive "grinding-wheel" grain, rolled deeply and densely into steel plate, makes ALGRIP truly non-skid. It's almost impossible to slip on this hard-gripping floor plate—even when it's wet or oily—even on steep inclines!

Benefit: *A three-way saving . . . (1) No more costly, crippling accidents. (2) More efficient work and better production. (3) A substantial reduction of workmen's compensation insurance premiums—substantial enough, in fact, to pay for the cost of the ALGRIP installation!*

End Slipping Accidents that Cripple Men and Production—and Kite Insurance Premiums.

A.W. ALGRIP—only abrasive rolled steel floor plate in the world—pays for itself in savings from safety. Get the full ALGRIP story today; write for our new Booklet AL-7 —without obligation.

Over 125 Years of Iron and Steel Making Experience

ALGRIP Abrasive Rolled Steel Floor Plate

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

Other Products: A.W. SUPER-DIAMOND Floor Plate • Plates • Sheet • Strip (Alloy and Special Grades)

VALVES & FITTINGS

Begins on page 192

Low-Pressure Valve With Neoprene Seat

This valve will hold pressure or vacuum. Also can be completely shut off against suspended solids. The resilient neoprene sealing element is the key to the valve's many uses.

The neoprene seat exerts pressure against the butterfly disk when the valve is closed. If a solid particle is caught between disk and seat, the seat deforms to maintain a tight seal. Won't be scored by abrasive particles either, the maker claims.

Seat is replaceable. Valve can be inspected or repaired without breaking the line.

Keystone Tool Corp., 5324 Kirby Dr., Houston 5, Tex.

■

CONTROL OF CORROSION in steam condensate systems can be achieved by using Hagafilm, says the Hagan Corp., Hagan Bldg., Pittsburgh. When fed into the boiler, Hagafilm vaporizes with the steam and deposits a protective film on the all metal surfaces where condensation occurs, the maker claims.

■

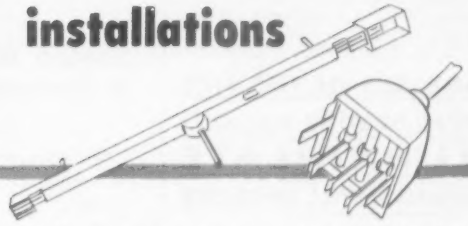
LONG AND EXTRA-LONG MALE ELBOWS made of steel are being manufactured by the Parker Appliance Co., 17325 Euclid Ave., Cleveland. These fittings are designed to give maintenance men greater flexibility in planning tube circuits.

Turn the page

MIDGET SIZE

FA POWER PLUGIN BUSDUCT

provides "Plug in and Go" Power for smaller installations



Midget Size FA POWER PLUGIN Busduct is the ideal system of power distribution for small machines and other similar plant equipment.

Underwriters' Laboratories approved, this modern system of power distribution provides 60 amp., feeder capacity for 2, 3 or 4 wire systems for ½ to 3 H.P., 240 volt motors, AC or DC with conventional type fuses and 7½ H.P. maximum for motors with dual element fuses.

The 2 and 3 conductor types provide 220 volts single phase or three phase power to motors, while the 4 conductor type provides single or three phase power for motors and 120 volts for machine illumination or small pump motors on return lubrication systems.

Midget Size FA POWER PLUGIN Busduct is only 3½ inches wide and 2 inches deep in size. It is available in five and ten foot sections with plugin outlets every twenty inches thus permitting machines to be moved in and out of production lines without slowing down or delaying operations. Special lengths and closer spacing of outlets are also available for application on production benches and equipment.

Contact your nearest FA representative, listed in Sweet's, or write for Bulletin No. 704, for further information on this economical, flexible system of power distribution.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

Our 61st Year

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

"THIS LUBRICANT KEPT 'EM ROLLING IN MUD, MUCK AND WATER"

—says J. O. ARCHIBALD
of Redwood City, California

The job was clearing 500 acres of salt marsh for crystallizing ponds. To quote, "We selected LUBRIPLATE No. 107 for track and general lubrication and LUBRIPLATE APG-140 for transmissions and final drives. During the entire job there was no replacements of track rollers nor any tie-ups of equipment due to parts replacement or breakage!"

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

Begins on page 140

MISCELLANEOUS

Aluminum Jacketed Chimney Material

A refractory insulated wall jacketed with aluminum furnishes a low-cost, long-life chimney material, maker says.

The wall is said to give as good a draft as brick-constructed chimneys. Cannot rust out and requires no painting or maintenance, according to manufacturer.

Comes in 36-in. sections. To get the proper chimney height, all you do is stack the sections. and seal with an acid-proof, high-temperature cement. Joints are secured by overlapping joint bands.

Van-Packer Corp., 209 S. LaSalle St., Chicago 4.

■

Special Binder Used in Surface Coatings

New surface coatings use special latex-water binders instead of water alone as the combining agent.

The result is a tough, flexible, water-retardent floor or surface coating which binds to masonry, concrete, plaster, wood, glass, and metal, manufacturer says.

Can be applied directly without special preparations to metal decks, stairs, pipe joints, and coverings. Also recommended by the manufacturer for use on roofing.

Surface Coatings, Inc., Atlanta, Ga.

■

X-RAY FILM HANGER designed for faster loading and safer unloading has been marketed by Hard & Co., Inc., 605 Main St., Ann Arbor, Mich. Offers accurate and automatic alignment of the film with respect to the hanger. Hangers will not become entangled or damaged when handled carelessly, the maker claims.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

Pipe Repair CLAMPS

Made for every type of leak—any temperature or pressure. Send for Catatog No. 41-O.

M. B. SKINNER CO., SOUTH BEND 21, INDIANA

STOP that WATER

With FORMULA NO. 640, a clear liquid which penetrates 1" plus in concrete, brick, stucco, plaster, etc. Seals out water, dirt. Holds 20' head. Use outside and in. Preserves all absorbent materials. Sold 14 years. Quick, economical, sure. $3 in 55's. Free sample. See Sweet's.

HAYNES PRODUCTS CO., OMAHA 3, NEBR.

STOP DUST

DUSTKOPS — **22 Models**
UNIT TYPE — 300 cfm to 10,000 cfm
LOW COST — ¼ hp to 15 hp

AVAILABLE FROM STOCK

For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS

Send for Cat. 605t; describe problem for recommendation by return mail, without obligation

AGET-DETROIT CO. • ANN ARBOR, MICH.

F L U X

SODERING, BRAZING, WELDING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

THIS PAGE IS BEING READ!

by most of the 55,690 plant operating men who pay to get FACTORY every month. Your ad in this space will be read by these same important buying influences. Start making sales contact with them at once.

"He who makes no mistakes does nothing"

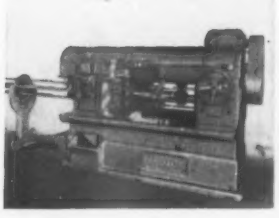
In a supposedly modern era it is sometimes claimed to be "smart business" to let a competitor take the lead and make profit from his mistakes. Obviously, if all business adhered to such a philosophy there would be no progress, if any business. "He who makes no mistakes does nothing". Cone leadership was founded — and is maintained — by active service, by doing things.

The Conomatic Carbide Development program expects to make a few mistakes. But, loss or gain, its efforts will contribute to the general benefit of all "automatic" users, users on whom all "automatic" builders are dependent.

The job illustrated compares actual production runs with HSS and 100% carbide tooling. It suggests the kind of pioneering that is being done at Cone. Full details are available.

MATERIAL—1112 STEEL: Hole drilled with 1" dia. drill to 2¼" depth. OD threaded to 2" length with 1¼"— 12 chasers.

	HSS	CARBIDE
Cycle Time	90 secs.	15 Secs.
Work Spindle Speed	370 R.P.M. at 103 S.F.	1500 R. P. M. at 417 S. F.
Tool Wear	1500 pcs. per grind	5000 pcs. per grind



Conomatic} CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Fasten it with STAINLESS STEEL

for Better Looks – Longer Life

LEADING PRODUCERS OF FASTENERS USE

ALLEGHENY METAL

A complete line of stainless steel fasteners—all types and sizes of bolts and nuts, rivets, wood and machine screws, cotter pins, washers, etc.—are made of Allegheny Metal by the leading manufacturers in this field. Get in touch with them for catalogs and prices, or write us direct.

ADDRESS DEPT. F-44

Allegheny Metal fasteners are non-rusting, non-staining. They will last as long as, or longer than, the materials they join. You can count on them to stand up through the years—both in strength and in bright good looks.

Best of all, stainless steel fasteners can be used anywhere. It isn't necessary that the materials to be joined are stainless—these corrosion-proof fasteners are the perfect answer for joining other metals, woods, or plastics.

Fasteners made of Allegheny Metal are produced in complete variety—every type and size that your job requires.

For improving quality and reliability wherever they're used—and for the economy of lifetime service—specify fasteners made of the time-tested stainless steel, *Allegheny Metal.* ● For any technical data or engineering help in the use of stainless steel, address *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

You can make it **BETTER** with

Allegheny Metal

TIME-TESTED STAINLESS STEEL

introducing

the Coffing COIL CHAIN

SAFETY-PULL

RATCHET LEVER HOIST

Here is a completely new ratchet lever hoist designed to bring you added safety and convenience. The Model RG incorporates the time-proved ratchet and pawl principle originated by Coffing — makes it hold positively at all times — no friction-type brake to slip or freeze — chain is free wheeling when not under load.

Advanced Guard for a New, Advanced Line

The Model RG is now available in 1,500- and 3,000-lb. capacities — other sizes will follow.

Many New Advantages

COIL CHAIN Swings or wraps in any direction for greater flexibility in use.

SIX OPERATING POSITIONS Handle operates in any position, works on full or partial strokes — for ease of handling in close quarters. Safety stops prevent spinning of handle.

BIG SAFETY FACTOR For your protection the Model RG has 100 percent overload safety factor, although the warranty covers only up to rated capacity. "Safety-valve" handle bends at point of maximum safe overload.

SIMPLE TO SERVICE The Model RG may be completely disassembled with only a screwdriver for easy servicing. Not necessary to return it to the factory for repairs.

COFFING HOIST Company

Danville, Illinois

Quik-Lift Electric Hoists • Hoist-Alls • Mighty-Midget Pullers
Spur-Geared Hoists • Differential Chain Hoists • Load Binders
I-Beam Trolleys

Sold by Industrial Distributors everywhere

GRIT

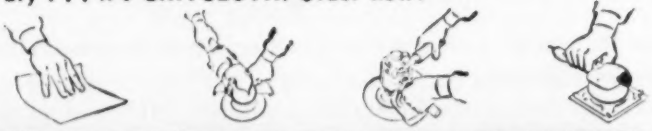
REVOLUTIONARY DISCOVERY...

The world-wide demand for our latest abrasive development, GRITCLOTH, has already forced us to increase our production capacity. Right now we are keeping abreast of the still growing clamor for this most advanced sanding material.

GRITCLOTH gives the removed particles a place to go and thereby maintains fast cutting action throughout its amazingly long life.

For machine and hand sanding or polishing . . . wet or dry . . . it's GRITCLOTH. Order now!

TOMORROW'S SANDING FABRIC TODAY!



Innumerable Uses for Metal and Paint Finishing.

Excellent for fast, smooth rubbing of prime coats on all boat and marine finishes. Extra-long life whether you use GRITCLOTH wet or dry.

Outstanding results from leading car manufacturers using GRITCLOTH for wet primecoat sanding. BOTH SIDES OF GRITCLOTH are used, for maximum life.

New production speeds in all metal fabrication finishing and deburring. Less down-time means more production and less cost with GRITCLOTH.

Non-loading feature gives GRITCLOTH tremendous advantages in speed and amount of material removed. GRITCLOTH saves you money on machine or hand polishing.

CLOTH

OPEN MESH SANDING FABRIC

PATENT APPLIED FOR

..."HEARD 'ROUND THE WORLD"!

★ 10 to 15 TIMES LONGER LIFE than the conventional types of coated abrasives.

★ NON-LOADING . . . OPEN MESH LETS THE REMOVED PARTICLES FLOW RIGHT THROUGH.

★ THOUSANDS OF SUPER-SHARP EDGES KEEP ON CUTTING.

★ USE WET OR DRY

★ FLAT OR FOLDED

★ BY MACHINE OR HAND

★ BOTH SIDES

★ APPLICATIONS ARE LIMITLESS . . . each day finds a new successful operation for this Miracle Modern Sanding Fabric.

Where can YOU use it?

BAY STATE

GRITCLOTH

...A BAY STATE PIONEERED PRODUCT

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass., U. S. A.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By PAUL A. KING • Attorney, Bigelow-Sanford Carpet Company, Inc.
Member, New York Bar

NLRB SAYS FINES ARE NOT "DUES AND FEES" IN A UNION SHOP. *Employee can't be fired for not paying union-levied fines for missing meetings* . . . . . **page 204**

WAGE-HOUR RULES FOR PENSION AND PROFIT-SHARING PLANS. *New rules aim at simplifying overtime computation* . **page 204**

UNION LABEL PICKETING OF RETAIL OUTLET ENJOINED. *It's not "free speech" when objective is to pressure company* . **page 206**

FREE EATS OFFER BY UNION NOT ELECTIONEERING. *Will not cause election to be set aside* . . . . . **page 208**

WHEN YOU CAN FIRE WORKERS WHO ASK FOR MORE. *Mass resignation rather than threat of resignation is not protected by the NLRB* . . . . . **page 208**

WATCH YOUR LANGUAGE DURING UNION DRIVE. *A slip of the tongue may upset an otherwise valid answer to the union's organizing campaign* . . . . . **page 210**

PERSONAL PRE-ELECTION INTERVIEWS OK'd BY NLRB. *That is, as long as employer doesn't get off base* . . . . . **page 210**

DATA ON EMPLOYEE STATUS MUST GO TO UNIONS. *Now you may have to furnish the union with notice of employee transfers, promotions, and so on* . . . . . **page 212**

"PANTHER HUNTING" IS STILL JUST A STRIKE. *Transparent substitute for strike under no-strike clause brings union a fine of $66,700* . . . . . **page 212**

BRIEF BUT IMPORTANT . . . *Fees for grievance handling illegal* . . . *Be-prepared advice on salaries* . . . *Strike record higher* . . . *Labor relations success story* . . . *Publication for retirees* **page 214**

Union Fines Are Not "Dues and Fees"

Discharges under union-shop labor contract clauses continue to be a problem. A union's request that you fire a worker for non-payment of "dues and initiation fees" can be particularly troublesome at times. Ignore the request and you have a showdown, perhaps a strike, over whether you're violating the contract. Fire the man and you may be socked by the National Labor Relations Board with an unfair labor practice charge.

Here's a case in point:

A union member didn't attend enough meetings to suit the union's leaders. So they fined him—but he refused to pay the fine. At the union's request, the man was fired. NLRB said that an employee can be fired for non-payment of dues and initiation fees where there is a valid union-security agreement—but not for non-payment of fines. (*Injection Molding*).

New Rule for Pension and Profit-Sharing Plans

In figuring an employee's overtime pay, the Federal Wage-Hour Law says that all amounts paid to him must be included in his "regular rate" of pay. Premium pay under wage-incentive plans, for example, must be added in before you compute overtime pay.

But what if you have a pension or profit-sharing plan? Do

No more drudgery for me in cleaning grease-caked floors

A flip of the switch re-sharpens brushes automatically!

His boss is happy too . . .

and should be. Now an Industrial Dry-Scrubber, Finnell's 84XR at left, does the job in about one-tenth the man-hour time required to hand-scrape the floors! And of course the machine is far more thorough, and spares maintenance men the back-breaking effort of manual methods. Equipped with two powerful scarifying brushes, the *84XR* digs through and quickly loosens even the most stubborn coatings of dirt, oil, grease, and shavings. Universal couplings enable the brushes to clean recessed areas that rigid coupling brushes would pass over and miss.

Reversible motor keeps wires sharp. *A flip of the switch* reverses the rotation of the brushes and re-sharpens them automatically . . . *while working!* Eliminates the need for frequent changing of brushes by hand in order to maintain a sharp cutting edge. Reversal of brush rotation also helps keep the brushes functioning efficiently by ejecting sticky substances that would otherwise clog and slow up the cleaning process. Total brush spread of the *84XR* is 22 inches. Low, compact design permits cleaning right up to and beneath machinery — areas where deposits are heaviest. Interchangeable rings and brushes adapt the machine to wet-scrubbing, polishing, and steel-wooling.

Brushes adjust to floor irregularities

Clean floors allow industrial trucks to move swiftly, surely and, according to actual tests, with *half the pull* it takes to move loads over dirty floors. In addition, clean floors aid safety underfoot and contribute to worker productivity. So it pays to keep floors clean — especially with a labor-saving *84XR!* (The Vacuum Cleaner at extreme left, *Finnell's 10B* for wet and dry pick-up, features a By-Pass Motor.)

For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2508 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything for Floor Care — FINNELL — 50th Anniversary

BRANCHES IN ALL PRINCIPAL CITIES

RUGGED GUARDIAN of Persons and Property

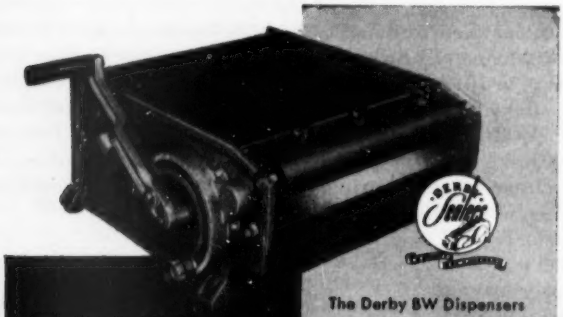
Bothersome intruders may roam your grounds . . . property appearance can be spoiled . . . employees need accident protection. These are jobs for Continental, the better installed, longer lasting chain link fence. Get peace-of-mind and protection permanence by contacting your nearest Continental sales office now.

*Trade Mrk. Reg. U. S. Pat. Off.

CONTINENTAL STEEL CORPORATION
Kokomo, Indiana
Please send FREE copy of "Planned Protection"—complete manual on property protection.
Name
Address
City State

CONTINENTAL STEEL
CONTINENTAL STEEL CORPORATION

PRODUCERS Of Manufacturer's Wire in many sizes, shapes, tempers and finishes, including Galvanized. KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.



Do you use barrier wraps?
Then you need the new
DERBY BW BARRIER WRAP MEASURING DISPENSERS

The Derby BW Dispensers eliminate the slow, messy, expensive Barrier Wrap handling problem and provide a substantial saving in time, labor and material. Large rolls may be converted into the exact widths and lengths desired in one single operation.

Available in models to accommodate 4", 6", 8", 12" and 14" rolls and equipped with Universal Slitter to deliver a variety of desired widths and definite lengths.

For further information write Dept. FMM

DERBY SEALERS, INC. DERBY, CONNECTICUT

PRACTICAL LABOR RELATIONS

Begins on page 204

you have to count your contributions to the plan in figuring the "regular rate" on which you calculate overtime? In the past, the rules haven't been too clear on that point.

Now comes a ruling from the Wage-Hour Administrator that is supposed to make life easier for you; it outlines more clearly just how you handle this problem.

You do *not* have to count your contributions if your pension or profit-sharing plan can meet these two tests:

1. "The primary purpose of the plan must be to provide systematically for the payment of benefits to employees on account of death, disability, advanced age, retirement, illness, medical expenses, hospitalization, and the like."

2. The plan must have been approved by the U. S. Treasury under Section 165(a) of the Internal Revenue Code.

Presumably, if you miss out on those tests—for example, immediate cash distribution on a profit-sharing plan — you would have to include your contributions in the "regular rate." But don't give up too soon. You might still avoid this situation by meeting certain other requirements. None of them look too tough.

For details, write to the Wage-Hour Division for a copy of the new rules.

Union Label Picketing of Retail Outlet Enjoined

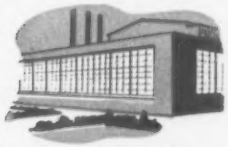
In Ohio, a union was organizing the factory of a clothing manufacturer. To put the heat on him, it picketed his retail outlet stores. The banners carried by the picketers said that the clothes were not union made—didn't have a union label. An

Put Liquid Aluminum to work in your plant!

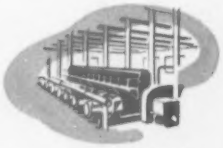
Sparkling *Liquid Aluminum* is amazingly resistant to rust . . . resists corrosion from smoke and fumes, too! It reflects up to 85% of heat and light rays—makes plant interiors brighter—minimizes expansion and contraction problems—reduces evaporation losses.

Look for the *Liquid Aluminum* label on the aluminum paint you choose for its countless uses inside and outside your plant. It is made to approved minimum standards by many leading paint manufacturers and is available through your regular paint supplier. Or write for names of manufacturers to Reynolds Metals Company, 2518 South Third Street, Louisville 1, Kentucky.

Reduce Maintenance Costs... Increase Plant Efficiency



Extends life of rustable metal windows—eliminates cost of frequent repainting.



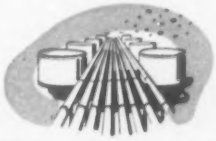
Brightens plant interiors to improve employee efficiency and morale. Repaints with one coat.

Protects and improves appearance. Makes standout background for plant signs.

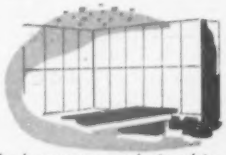
Provides added insulation for piping—cuts heat losses—protects and beautifies.

Improves visibility in faintest night light—prevents emergencies from becoming disasters.

Makes stairs safer when applied to tread edges. In stairwells it also improves lighting.



Reflects sun's heat rays to hold down inside temperatures—reduce evaporation losses.



Seals masonry against moisture in locker and shower rooms—in humid processing areas.

SPECIFY *LIQUID ALUMINUM* WITH ASPHALT FOR ROOF PAINT OR COATING.

Here's economical, lasting, one-coat protection for your built-up or your rustable metal roofs! *Liquid Aluminum* Roof Paint or Coating adds years to roof life by retarding decomposition of the asphalt. It also keeps buildings cooler in summer; cuts air conditioning costs; increases employee efficiency and morale. The *Liquid Aluminum* label and the special Warranty Seal are your assurance of quality roof protection. Write for folder with more complete information.

This advertisement appears in the interest of the Paint Industry of America.

ENGINEERED
and MANUFACTURED
AS A PRECISE TOOL

ENTIRE CHUCK BODY HARDENED INSIDE and OUT... TAPERED CHUCK BORES HARDENED AND GROUND TO CLOSE TOLERANCES

SUPREME Brand CHUCKS are expertly engineered to give top performance in the field. Jaws are of nickel chrome moly alloy steel expertly heat treated . . . key holes do not extend into body cavity thereby sealing out dirt . . . entire chuck is hardened inside and out . . . one piece geared nut construction. Careful precision manufacturing produces a chuck that gives long trouble-free service in the field.

Your investment in Supreme brand Chucks is a wise one for they will give the kind of service that stretches your dollars.

SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME... SUPREME

PRACTICAL LABOR RELATIONS

Begins on page 204

Ohio court enjoined such picketing. The court disregarded the union's contention that it was merely exercising its right of free speech, said the objective of the picketing was unlawful. (*Richmond Bros. Co.*)

Free Eats Offer by Union Not Electioneering

"Free eats" for workers is not against the law, according to the National Labor Relations Board.

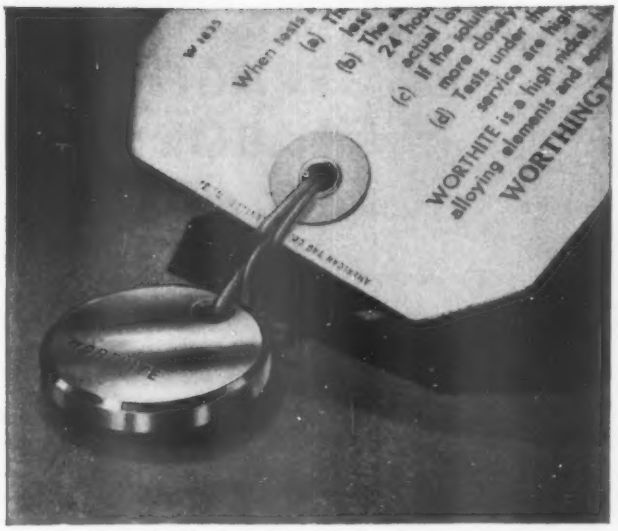
During a union election, one of the unions involved parked a loudspeaker car across the street from the polls and during the voting session advised workers that refreshments would be served to all who stayed to hear the election results. The NLRB said that this was not the kind of electioneering which should upset an otherwise valid election. (*Southern Trent Distributors.*)

When You Can Fire Workers Who Ask More

There's a right and a wrong way for your non-union employees to ask for more money. If a group of them send in their resignations effective such and such a day and state that they are resigning because you won't give them a raise, you can replace them—even before the scheduled termination day.

But if they say they will resign if you do not give them more money, then watch out. Their threat is protected by the National Labor Relations Board as a "concerted activity." If you replace them, you may be guilty of an unfair labor practice. This is the gist of a recent NLRB decision. (*Crescent Wharf and Warehouse.*)

Turn the page

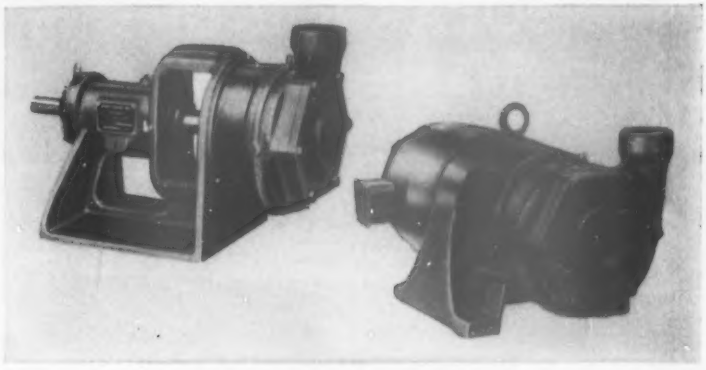


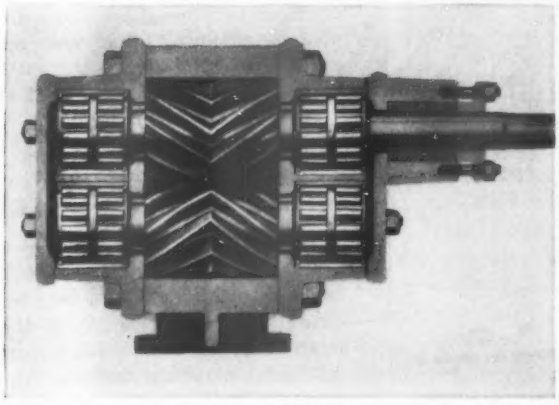
Which of these pumping problems is costing you money?

Pumping problems can cut into your plant's production and profits—or they can be solved by selecting the most efficient pump for each job. To aid in this sometimes difficult selection, Worthington offers complete lines of every major type pump. Here are three examples of the way Worthington design overcomes specific pumping problems.

⬆ CORROSION?

A number of years ago, Worthington's chemical engineers developed the high-nickel, high-chromium, molybdenum alloy, Worthite. The complete line of Worthite chemical pumps withstands a wider range of corrosives, yet sells for less than most stainless steel pumps. Write for a free sample of Worthite to test in the various solutions your pumps may be called on to handle.





⬆ SPECIAL JOB CONDITIONS?

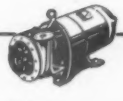
Worthington's standardization of parts, mountings, materials and dimensions gives you 60,000 centrifugal pump combinations (frame-mounted and Monobloc types) from which to choose the one that meets your needs exactly. This unequalled selection of *standard* pumps eliminates the slow, costly custom manufacture of the correct centrifugal pump for every job.

⬅ HIGH VISCOSITY?

Worthington rotary pumps use herringbone gears to handle viscous liquids at capacities up to 5000 gallons per minute against pressures to 500 psi. The herringbone gear design eliminates end thrust, trapping, and produces smooth, pulsation-free flow. Four heavy-duty roller bearings placed close to the load prevent shaft deflection.

For further information on Centrifugal, Rotary or Worthite pumps, see your local Worthington distributor, or write to Worthington Corporation, Pump and Compressor Merchandising Division, Section PC.3.11, Harrison, New Jersey. PC.3.11

COMPRESSORS: AIR-COOLED, WATER-COOLED

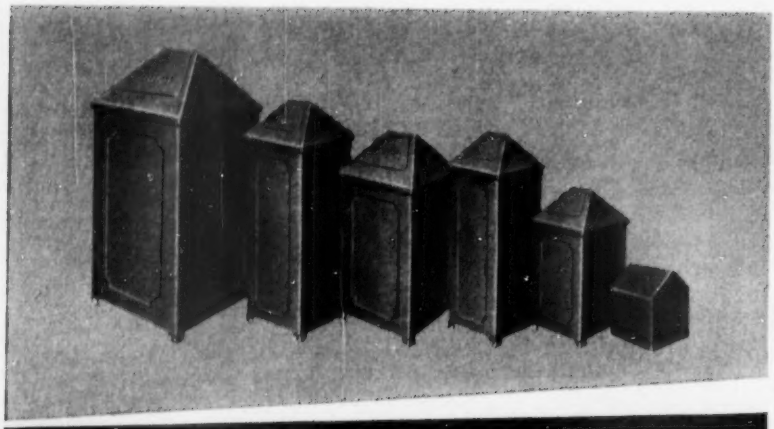

PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER

MULTI-V-DRIVES: 60 SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED

WORTHINGTON
Standard Pumps

Specify These Worthington Standard Products on Your Equipment



Setting a NEW Pace . . . with the NEW

SOLAR Self-Closing Waste Receptacle

the ORIGINAL Self-Closing Waste Receptacle

7 SOLAR FEATURES
Safe to Use
Cuts Overhead
Cuts Cleaning Costs
Cuts Plumbing Expense
Reduces Fire Hazard
Quiet in Operation
Withstands Tough Usage

Refinement of design and engineering techniques are fully expressed in the beautiful new "200" series of SOLAR Waste Receptacles.

The gravity swinging top, exclusive with the SOLAR, assures increased sanitation and safety under the most rigorous working conditions.

Solar-Sturges Waste Receptacle Div., PRESSED STEEL CAR COMPANY, INC., Melrose Park, Ill.

PSC

SEND FOR BULLETIN

Solar-Sturges Div.
Pressed Steel Car Company, Inc.
Melrose Park, Illinois Dept. FM-1
Gentlemen:
Please send me literature on Solar's new line of self-closing waste receptacles.

Name.....
Firm Name.....
Address.....
City.....Zone....State.....

PRACTICAL LABOR RELATIONS

Begins on page 204

Watch Your Language During Union Drive

You can't be too careful when you address your workers during an organizing campaign. For example, here's a case where one little slip caused trouble:

The National Labor Relations Board set aside an election of bargaining representatives because the employer told his workers before the election that he intended to make November 4, election day, a paid holiday.

The heartbreak in this case was that the employer had been accused of violating the captive-audience rule (addressing his employees without giving the union a similar opportunity) and had succeeded in exonerating himself. But his unfortunate "promise of benefit" licked him. Even so, two Board members dissented, claiming that the announcement wasn't substantial enough to set aside an election. (*Reeves Instrument.*)

Personal Pre-Election Interviews OK'd by NLRB

Even today, some employees are awed by the presence of their employer. One employer was accused of taking advantage of this psychology by having his superintendent or office manager call workers individually into their respective offices to tell them:

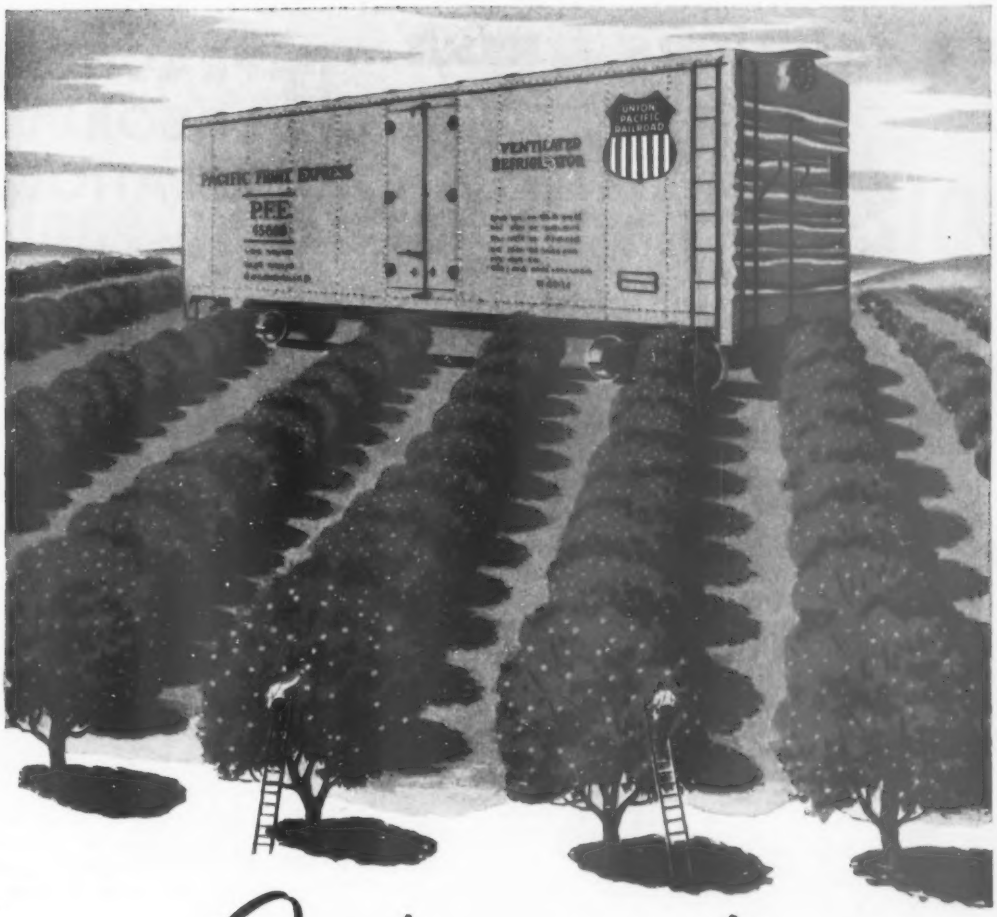
(1) that the state of Texas had an open-shop law;

(2) that they could belong or not belong to the union.

It happened a week or two before the National Labor Relations Board conducted an election.

This conduct was not unlawful, said the NLRB. (*Fehr Baking.*)

Turn the page



Orchards to You!

In one way or another, fresh western-grown fruits are of importance to you. Especially so if you are a grower, canner, packer, wholesaler or retailer of fruits. But whatever your business might be, you and your family benefit from the health-building vitamins which Nature has packed into apples, oranges, peaches, pears and other varieties of fruit.

To bring *orchards to you,* Union Pacific has refrigerator (P.F.E.) cars available for shipment of fruits . . . also vegetables and other perishable commodities . . . from western producing states to eastern destinations.

Modern icing stations along the U. P. route provide adequate protection of perishables *all the way.*

UNION PACIFIC RAILROAD

for a fabulous finish...

JEWEL BRAND
Abrasive Belts

for grinding, sanding, polishing — metal, wood, leather, plastics, rubber.

ABRASIVE PRODUCTS, INC.
519 Pearl Street
South Braintree 85, Massachusetts

PRACTICAL LABOR RELATIONS

Begins on page 204

Data on Employee Status Must Go to Unions

Whenever an employee is promoted, transferred, retired, or his status otherwise changes, better tell the union. If you don't, an unfair labor practice charge may be brought against you—with a fair chance of success.

The National Labor Relations Board now requires employers to furnish this data if unions request it—even though your contract leaves reclassification entirely up to you.

Suppose you are willing to to furnish status data when a specific grievance comes up. Nice—but not enough, says NLRB.

It seems these days that the union can share almost everything the employer has—except his losses. (*New Britain Machine Co.*)

"Panther Hunting" Is Still Just a Strike

"Panther hunting," at best, is a transparent substitute for a strike—and a costly one for the union, in this case.

What's panther hunting? It's the latest union device to call a strike—when the contract has a no-strike clause.

Union bulletins—after a decision to go on strike—called upon workers to join the "posse to hunt for the black panther." When? The next morning—at the union hall. The union placed a "cage for the black panther" near the plant gate.

The device seemed to work. Members walked out. But the cost of panther hunting came high. The employer was awarded $66,700 by a jury, as damages caused by the walkout. (*Electrical Workers vs. Oliver*)

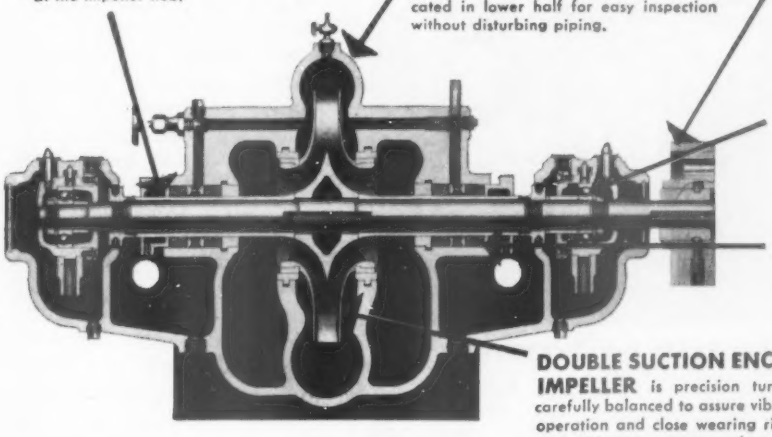
Turn the page

Look for These 7 Signs of GOOD PUMP DESIGN

CAST SHAFT SLEEVES, not commercial tubing, save the shaft from wear. Sleeves extend through the stuffing box and seal at the impeller hub.

HEAVY HORIZONTAL SPLIT CAST-IRON CASING construction with suction and discharge nozzles located in lower half for easy inspection without disturbing piping.

COUPLINGS have *Magic-Grip* quick change bushings for pump and drive shaft. Pin and rubber bushing type usually used. Removal for maintenance is easy.



BALL BEARINGS may be furnished for either oil or grease lubrication. Sleeve bearings also available in larger sizes.

GENEROUS STUFFING BOX LENGTH contains sufficient packing to keep stuffing box maintenance low. Provision is made for sealing water connections or for grease seal if these are required.

DOUBLE SUCTION ENCLOSED IMPELLER is precision turned and carefully balanced to assure vibrationless operation and close wearing ring clearance. Water passages are hand finished to a smooth surface.

STANDARD AND SPECIAL MATERIALS are available for many types of service where government regulations permit. Iron, bronze, stainless steel and combinations of these materials handle both alkaline and acid solutions. Standard sizes carried in stock range from 10 to 7000 gpm with heads as high as 475 feet.

THESE DESIGN AND CONSTRUCTION features of Allis-Chalmers double suction pumps assure long pump life and low maintenance costs. Every A-C double suction pump is carefully tested on the most modern pump testing equipment in the industry.

Complete Pumping Unit

Allis-Chalmers can furnish the complete pumping unit — pump, motor, control and drive — all of coordinated design and manufacture.

Whatever your pumping problem, call your nearby Allis-Chalmers Authorized Distributor or District Office. Or write for Bulletin 08B6146. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3952

Texrope, Magic-Grip, and Vari-Pitch are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

ALLIS-CHALMERS

Start With Any One of These

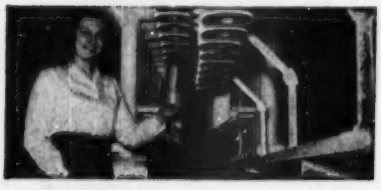
FOUR WAYS To Cut Your Handling Costs

1 WITH ROLLER OR BELT CONVEYORS

— Wherever packages, parts, or units have to be handled — do it faster, better, cheaper, with Standard roller or belt conveyors, power or gravity. Standard also builds slat, chain, wheel, or pushbar conveyors to fit your needs.

2 with a HANDIBELT

— a small, light, compact, easily portable and maneuverable conveyor unit that stacks, loads, unloads cases, cartons, packages up to 135 lbs. in weight. Can be used inclined, declined or horizontal. Electric motor operated.



3 with SPIRAL CHUTES

— effective time, work and money savers lowering pieces, parts, packages floor to floor. Scientifically designed and properly pitched—available in many types and sizes. Cost nothing to operate.

4 with PNEUMATIC TUBE SYSTEMS

— provide swift, sure, safe transportation of messages, documents, blueprints, samples, small parts, money; cylindrical or oval tubes 1½ inch upward with dispatching and receiving terminals for complete systems to meet your needs. Write for special bulletin SPT.

Write for standard's general Catalog No. FM-83. Tell us what you want to handle or name equipment on which you want more information.

STANDARD CONVEYOR COMPANY
North St. Paul 9, Minn.
Sales and Service in Principal Cities

PRACTICAL LABOR RELATIONS

Begins on page 204

BRIEF BUT IMPORTANT

►**Fees for grievance-handling illegal.** The National Labor Relations Board orders a union to give up its practice of charging nonunion employees special fees for handling their grievances. If it refuses, it may lose its certification, says NLRB. (*Hughes Tool*)

►**Be prepared advice on salaries.** Forward-looking management is adopting the "boy scout" approach to salary freezing, says Joseph D. Cooper, executive director of the Office of Salary Stabilization. One can't predict when salary freezing may return. So just in case, many are setting up organization and salary schedules an easier "next time."

►**Strike record higher.** Strike idleness in 1952 was the highest since 1946. Reason: Steel strike in June and July.

►**Labor relations success story.** One factor in the successful relationship between the American Velvet Co., Stonington, Conn., and the Textile Workers Union (CIO) is a profit-sharing plan that has paid employees bonuses of 11% to 39% of their annual wages. The National Planning Association, which studied labor relationships at the company, hastily adds that the bonus plan is on top of a fair wage structure.

►**Publication for retirèes.** A publisher is about to announce a special newspaper designed to be read by retired employees and purchased for them by their former employers.

NOW
more sizes of...

Stainless Socket Cap and Set Screws

Available in stock from your Allen ⬡ Distributor

Demand for rust and corrosion resistant socket screws of high finish 18-8 stainless steel has been increasing steadily for ten years.

Allens have become the leading make because of the inherent advantages of Allen manufacturing methods, and because Allen Distributors carry the widest range of sizes as standard stock items – saving their customers time and money.

Now Allen widens its margin of leadership with still more distributor-stocked standard sizes in stainless:

97 Standard Sizes in Stainless Steel Socket Cap Screws

#4 x ¼" to ⅝" x 3" with NC threads
#10 x ⅜" to ⅜" x 1½" with NF threads

54 Standard Sizes in Stainless Steel Socket Set Screws

#4 x ⅛" to ½" x 1" with NC threads
#10 in lengths from ⅜" to ¾" with NF threads

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.

Sold only through leading industrial distributors

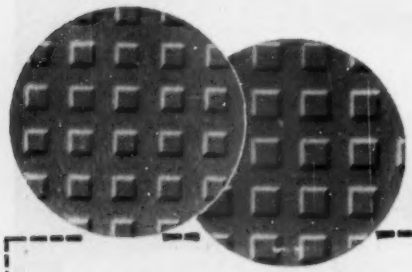
THAT SETTLES IT- WE INSTALL FLOOR PLATES

The safety of your employees and the public is good enough reason to install walking surfaces of slip-resistant J&L Jal-Tread floor plate.

But here are some other important advantages you'll get when you specify Jal-Tread, the only true checker-board floor plate.

- Reduced worker fatigue from feet rocking on uneven surfaces.
- No wheel shimmy in hand industrial trucks.
- Neat appearance . . . easy draining and sweeping in any direction.
- Easy fabrication—square design allows cutting without shearing through raised cleats . . . permits welding joint of uniform thickness.
- Easy cold-forming on standard equipment.

Mail the coupon for more information today. You'll find J&L Jal-Tread will pay off in greater safety . . . lower maintenance costs.



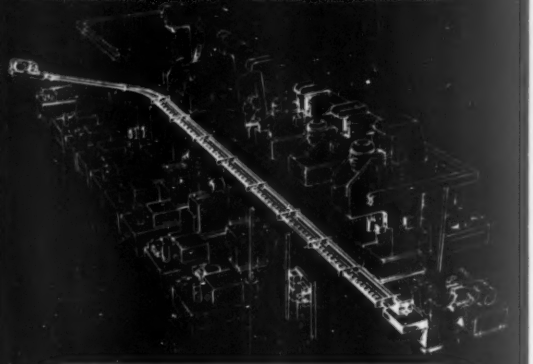
J&L STEEL

Jones & Laughlin Steel Corporation
498 Gateway Center
Pittsburgh 22, Pa.

☐ Please send me your free booklet on J&L Jal-Tread.
☐ Please have your representative call.

Name_____
Company_____
Address_____
_____

NATCO selects HAPMAN TUBULAR CONVEYOR TO REMOVE ALL CHIPS from 98-operation HOLEWAY MACHINE



AUTOMATIC CHIP REMOVAL IS ESSENTIAL while this machine mills, trepans, drills, counterbores, reams and chamfers a cylinder block every 1.1 minutes!

SO NATIONAL AUTOMATIC TOOL CO. SELECTED A HAPMAN Tubular Conveyor as an original component for the unit. With its Neoprene Flights and patented Sealed-Pin Chain, this Conveyor provides the engineering excellence required for such an important investment.

HAPMAN CONVEYORS CAN DO THE JOB on many of *your* machine tools, sludge tanks and other equipment too! On new machines—or added to existing equipment—they'll convey almost any bulk flowable material in your plant at big savings!

Conveyor cross-section shows Flights and Sealed Pin Chain.

GET FULL DETAILS. WRITE FOR BULLETIN FM-853

Hapman CONVEYORS, INC.
DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

Handclasp of a friend-in-need

There's confidence in the very "feel" of the world famous C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers. The quick-acting "Squeez-Grip" fits your hand naturally like a handclasp ... hangs right ... carries right ... works right. You're in complete command of the situation instantly ... no fumbling ... no fatigue.

From the non-conducting, shatterproof discharge horn to the high strength, durably finished cylinder, you get top quality construction that results in a lifetime of satisfactory service. Because of the very few working parts and corrosion resistant materials throughout, the total cost to you over the years is less than other initially lower priced makes ... fire after fire, recharge after recharge, without trouble.

It's not hard to see, when you fully compare and try, why C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers are your best buy for killing flammable liquid and electrical fires, as well as some surface fires involving ordinary combustible materials. Sizes range all the way from 2½ to 100 pounds capacity ... all fully approved by the Underwriters' Laboratories, Inc., Factory Mutual Laboratories, Armed Forces and Government Bureaus.

With C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers the penetrating carbon dioxide is a clean, dry, non-damaging, non-conducting, inert gas ... smothers fire instantly, leaves no after fire mess ... harmless to equipment, materials and finishes ... even food is still perfectly edible.

Act now for complete free information on these first-rate, sure-acting fire extinguishers. Remember fire doesn't wait ... get the facts today!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

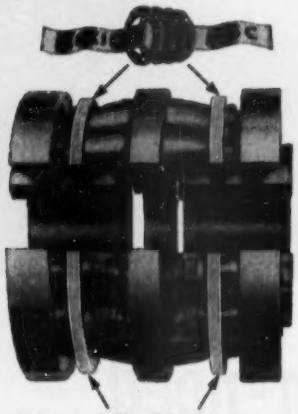
C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

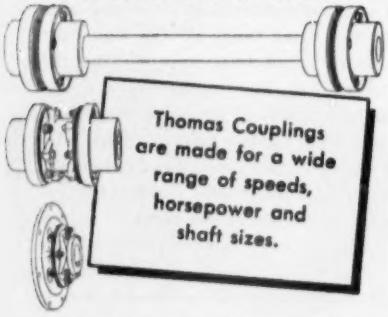
AFFILIATED WITH PYRENE MANUFACTURING COMPANY

Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

NO MAINTENANCE PROBLEMS

ALL PARTS ARE SOLIDLY BOLTED TOGETHER

Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

WORKER PSYCHOLOGY— A FORMULA THAT WORKS

BY DANIEL KRAKAUER • Vice President, Kay Manufacturing Company, Brooklyn

Here's a long-haired topic that gets crew-cut treatment—all the 75¢ words have been taken out. It's a simple formula for understanding the psychology of the guy in the shop—and his boss, too. What makes it useful, we think, is that the author has been making his formula work for years. And running a good, profitable plant in the process.

"BILL," I asked, "how did that trouble start?"

Bill, our mold department foreman, fidgeted. "Well, it began last week when the boys learned we were preparing incentive rates on shaping. They've been touchy ever since. Nothing's been any good—parts, floor, service, or me. This morning the steward turned up with a specially raw complaint, and I blew my top."

"I'm a little surprised at that," I said, trying to feed Bill's confidence by implying that I knew he could do better. But he didn't seem to get the hint.

"Yeah," he said. "That guy's short on self-esteem. So he insults easy and blows up like a penny balloon." Bill was blowing up himself. "And I'm supposed to be understanding. Listen! What that steward needs is a punch in the face. And the whole department should get a week's layoff for walking out with him.

"I'm getting tired of those guys, and I'm getting tired of this job. I should've taken that offer I got for more dough. And, most of all, I'm getting tired of you and your half-baked psychological theories."

There was a 3-second pause while I got a grip on my own temper. All I could say was, "I'm sorry you feel that way, Bill." He gave me an odd look and left.

Next day Bill was back bright and early—looking cheerful too.

"The boys are in this morning," he said, "like nothing ever happened. Working good, too. You know, after thinking this over, I don't believe we should make an issue of it. It really hasn't happened in a long time. Guess we're all entitled to get real mad once in a while."

He turned to leave, paused, turned back, and grinned.

"About that other job I mentioned—I never really gave that a second thought. I would've made more, but they treat everyone like hired hands. You know the kind—do this, do that; never mind why, that's our business.

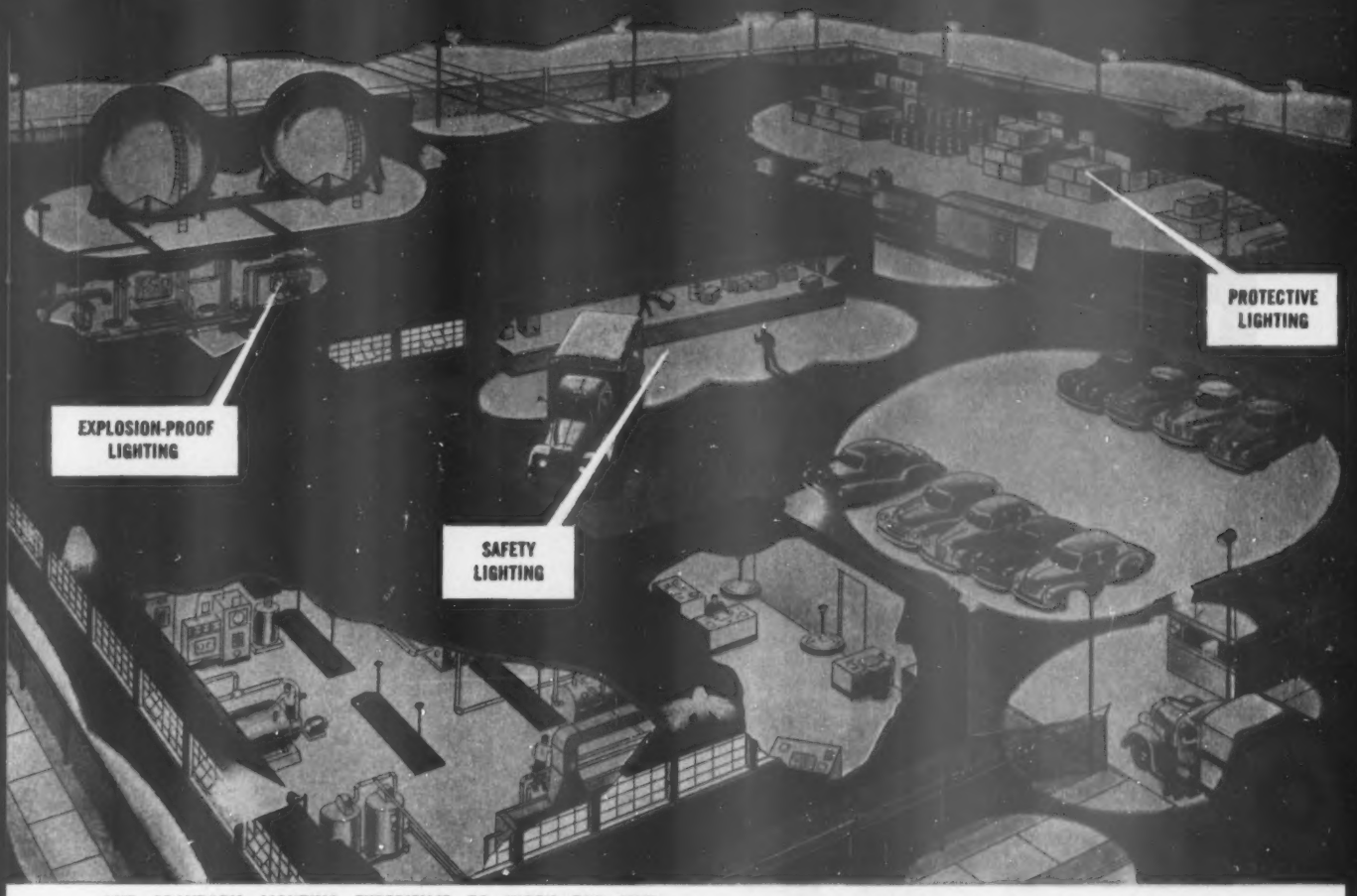
"Besides," his grin widened, "where could I find another boss I could really talk to?"

Does that sound like just another "good guy" in business? Could be. But I don't think that's the whole story, even though the "good guy" happens to be me. Actually, there's more to it. I think it really shows that we know what people want.

Magic? We don't think so. We're using a 5-point checklist that, we believe, wraps up the fundamentals of human nature.

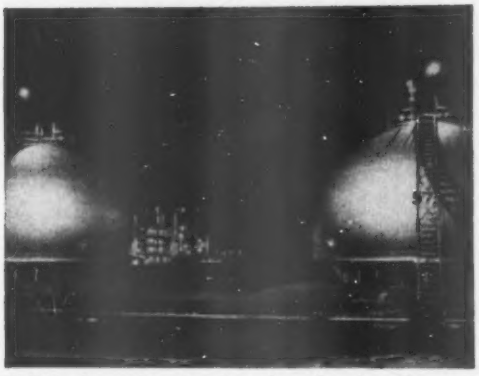
Here's a real management tool; just as real as, say, a motion study checklist or a job instruction checklist. Just as real and even more potent. We can constantly check to see that we are giving what people really want.

Turn the page



PUT GRAYBAR'S LIGHTING EXPERIENCE TO WORK FOR YOU You can count on Graybar for accurate, helpful information on any of these typical lighting installations. We'll be glad to work with you in planning practical solutions to the more specialized applications of protective lighting, safety lighting, and explosion-proof lighting. The fixtures and wiring materials they require can be conveniently secured through your near-by Graybar office.

How to simplify complex lighting projects



Lighting hazardous locations in refineries, chemical plants, and plant fueling stations, for example, requires specialized techniques. A Graybar Lighting Specialist will help you select lighting units and fittings to provide maximum protection against the danger of explosion.

If the lighting project you're planning is a specialized application, it will pay you to call in a Graybar Lighting Specialist. He's ready to help you or your electrical contractor analyze and develop layouts for all kinds of protective and explosion-proof lighting.

But, no matter what the job — when it first comes up — *that's* the time to contact your local Graybar Representative. Let *him* furnish the delivery, price, and specification data you need to make up project estimates and job schedules. You'll get it fast, too, because Graybar people have this sort of information right at their fingertips. Later on, it's a simple matter to write out a single order for all the fixtures, wire, and fittings you need — saves dollars both in time and paper work.

Remember, Graybar distributes over 100,000 different electrical items, including the most complete selection of lighting units and lamps available anywhere. In fact, it pays to check with Graybar for *everything electrical* — for wiring, power, ventilation, and communication, as well as lighting. 201-118

Graybar Electric Co., Inc.
Executive Offices: Graybar Building
420 Lexington Ave., New York 17, N. Y.

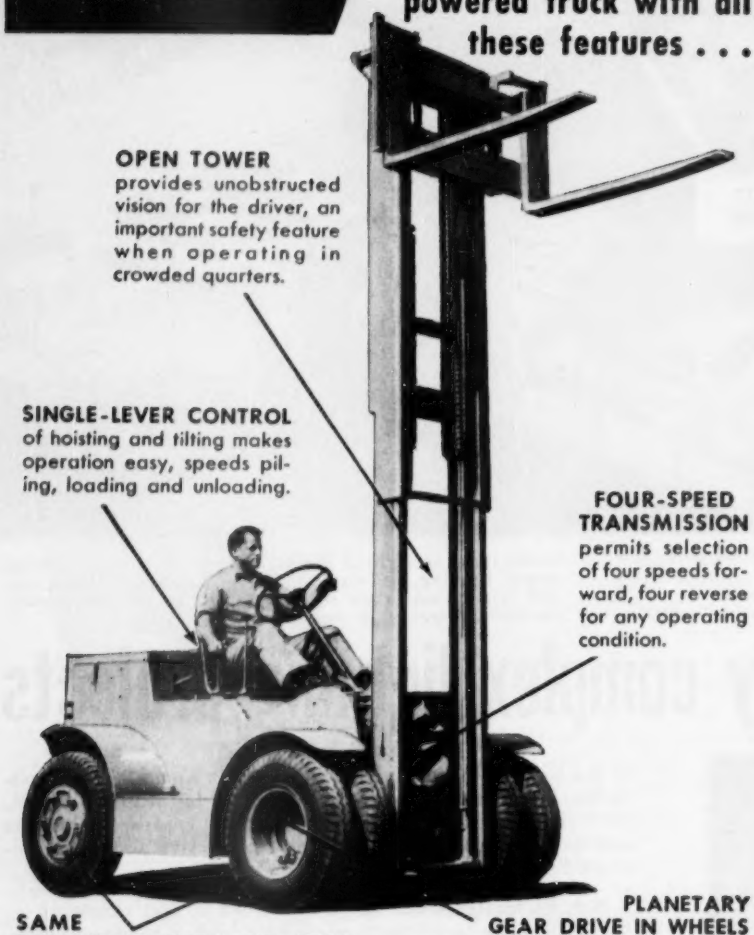
Get convenience, service, reliability . . . via GraybaR

IN OVER 100 PRINCIPAL CITIES

HERE'S THE FORK TRUCK YOU'VE BEEN NEEDING . . .

ROSS SERIES 6

the only 6,000 lb. gas-powered truck with all these features . . .



OPEN TOWER
provides unobstructed vision for the driver, an important safety feature when operating in crowded quarters.

SINGLE-LEVER CONTROL
of hoisting and tilting makes operation easy, speeds piling, loading and unloading.

FOUR-SPEED TRANSMISSION
permits selection of four speeds forward, four reverse for any operating condition.

SAME TIRE-SIZE FRONT AND REAR
permits switching tires for lengthier service, simplifies stocking of spares. 7.50-15 standard, 8.25-15 optional

PLANETARY GEAR DRIVE IN WHEELS
reduces wear and tear on differential and drive axles, assures long-lived performance under adverse conditions.

For materials handling savings up to 75%, you can count on the Ross Series 6. It's engineered throughout for *all-around* top performance. Weight is balanced to achieve the best in stability and traction. It has more *live* counterweighting than any other truck of comparable size and ruggedness. It affords the best in driver-visibility. It's easy to handle, economical to operate.

When you need a fork truck in the 6,000-pound range, invest your money in a truck that's engineered for *your* needs. You'll be way ahead. For complete information on the Ross Series 6, call your nearest Ross dealer.

Rely On ROSS

THE ROSS CARRIER COMPANY

Direct Factory Branches and Dealers Throughout the World

725 MILLER ST., BENTON HARBOR, MICH., U.S.A.

WORKER PSYCHOLOGY

Begins on page 218

And we can tick the points off on the fingers of one hand.

IT ALL BEGAN LIKE THIS • Back in '46, toward the end of the OPA, we had a strike that didn't make sense. Our people wanted a big raise. Our prices were fixed, and our volume was low. A raise just wasn't in the cards.

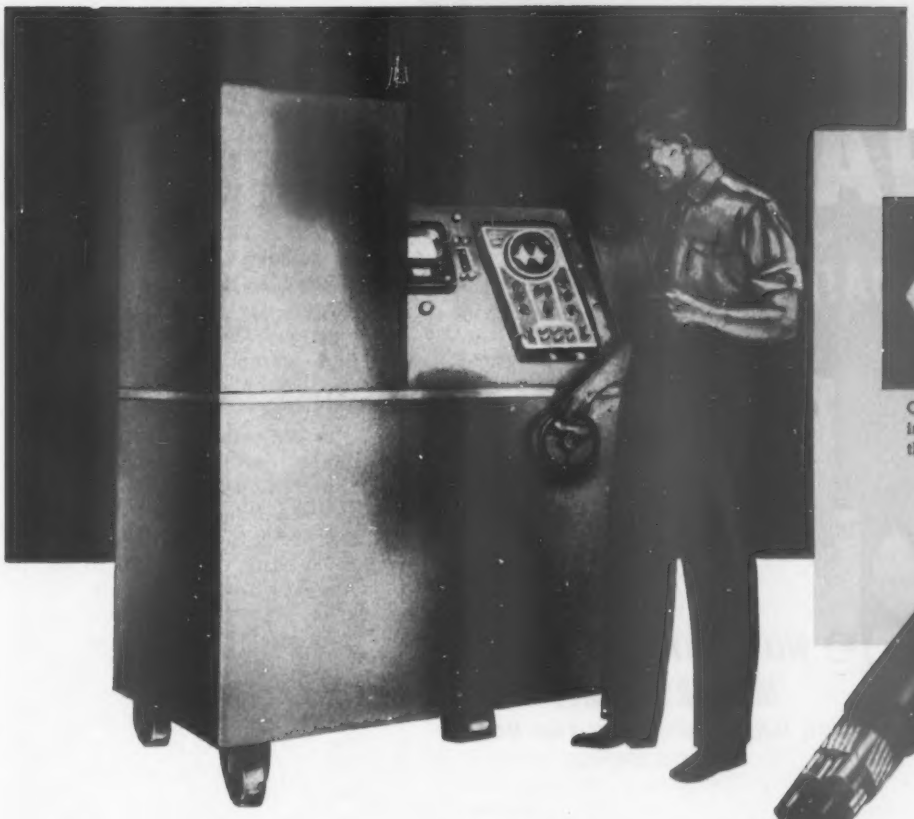
The long strike set the management thinking—for which we had plenty of time. Why do people act contrary to logic? That was really one for the books. So we turned to the books. We surveyed the major psychological theories—with disappointing results. What we were after was probably there, but we wanted it spelled out. Finally a workable answer turned up in an article by Professor A. H. Maslow, entitled "A Dynamic Theory of Human Motivation," (*Psychological Review*, 1943, Vol. 50)

FIVE BASIC NEEDS • Dr. Maslow's article ran to 26 pages, but it was in plain English. It was made up mostly of familiar psychological ideas, but it put them together in a way that made sense.

We, the people, says the professor, seek five basic satisfactions from life. To put it another way, we are born with five built-in needs that influence everything we do. Each of these needs affects us continuously, but at any one moment one or two of them dominate us.

There is a definite sequence of domination; these five needs have priorities within us. Need Number 2 doesn't dominate until need Number 1 is partly satisfied. Need Number 3 doesn't dominate till need Number 2 is partly satisfied. If need Number 2 is no longer satisfied, need Number 3 fades and need Number 2 dominates again.

1. To stay alive and to be alive. We *need* to breathe, eat, sleep, reproduce, see, hear, feel. But in our America need Number 1 rarely dominates us. Real hunger,



Oscilloscope trace indicates ionization of this power cable.

4 AWG stranded 3/c RoZone® insulated, shielded, RoPrene sheathed power cable, 5000 volts.

How we prevent trouble *before* trouble begins

The instrument, pictured above, is your assurance of maximum protection against one of the most insidious of cable hazards . . . ionization.

Ionization, which is the electrical break-down of air in pockets within the insulation, or between insulation and conductor or shield, often causes several destructive electrical effects. Included are possible ozone cutting, reduced dielectric strength and increased dielectric loss . . . any or all of which may result in reduced cable efficiency and early failure.

Perhaps the most hazardous thing about ionization is that ordinary visual, physical and electrical tests will not show evidence of it.

But you can count on maximum protection against ionization when you specify Rome insulated cables. *Every foot of every cable rated at 3000 volts or over is thoroughly tested by this specially designed ionization detector.*

This completely new NONDESTRUCTIVE testing method accurately measures the corona level of the entire cable. This extra step in Rome Cable's standard manufacturing procedure was developed by Rome engineers and was first described in AIEE paper 48-198, "The Measurement and Investigation of Ionization Level of Rubber Insulated Cables," presented in August, 1948. A copy is yours for the asking —check and fill in slip below.

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE CORPORATION, Dept. FM-8, Rome, N. Y.
Please send me a copy of ..... AIEE paper 48-198
..... Rome Power and Control Cable Catalog.

Name.....
Company.....
Address.....
City..... Zone..... State.....

NOW!

THE

DYNACLONE®

PATENTED

The ULTIMATE in Dust Filters

❶ CONSTANT SUCTION
AT DUST SOURCES

❷ SELF CLEANING
FOR CONTINUOUS OPERATION

❸ NO AUXILIARY MOTORS OR BLOWERS
(THE MAIN OPERATING FAN DOES THE CLEANING)

❹ NO ABRASION OF BAGS BY THE CLEANER

The traveler (T) is open to atmosphere by means of a 4-inch flexible hose. As the traveler contacts the open end of each bag, the negative pressure which exists in the dust chamber draws a blast of air (from the atmosphere) through the bag to thoroughly clean it.

Each bag is cleaned, on an average, once every five minutes, thereby assuring uniform suction at dust sources.

The Dynaclone has now been in operation in many different industries for the past three years. More than half of present orders are from the same customers.

SEND FOR BULLETIN . . . NO. 102

THE W. W. SLY MFG. COMPANY
4755 TRAIN AVENUE • CLEVELAND 2, OHIO
New York • Chicago • Philadelphia • Syracuse •
Detroit • Buffalo • Cincinnati • St. Louis •
Minneapolis • Birmingham • Los Angeles • Toronto

SLY PIONEERS & LEADERS in INDUSTRIAL DUST CONTROL

Begins on page 218

for example, is rare. True, most of us men don't get all the sex we want, according to Kinsey. But all in all, our Number 1 need is satisfied. Only an occasional experience — two days without sleep, a day without food, 30 seconds with a crumb in our windpipe—serves to remind us that need Number 1 still operates within us.

2. We want to feel safe—from danger or pain, for example, from competitors or criminals, from an unsure future or a changing present. None of us can feel 100% safe. Yet most of us in America feel reasonably safe—after all, we have laws, police, insurance, union contracts, and so on. Our Number 2 need is fairly well satisfied. Therefore, it is not dominating most of us. But the resistance of people to change, the cry for social security, seniority rights, the money we spend on Army and Navy—these and many more remind us that our safety need too, still operates within us.

3. We want to be social. From our very beginnings we have lived together in families and tribes. We marry, join lodges, make parties, even pray in groups. There is, however, a tremendous variation in the extent this deep need is fulfilled among us. You can gage this by checking how close different people can feel to their fellows. Most of us are not hermits, of course. We are capable of meeting and socializing with others. Not so many of us are capable of frank and deep relationships — even with our wives or close friends. And few among us can achieve that feeling of brotherhood, or acceptance of our fellow mortals with all their faults, that all great religious leaders intuitively recognize as one of the things people deeply want and respond to.

4. We need to feel worthy and respected. This is the need that we imply when we talk about our dignity, our self-respect, our

HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 1 | AUGUST 1953 | Number 4

Coal Washer Maintenance Costs Cut in Half

Maintenance costs on the coal washer for a big steel plant were running as high as $18,000 a month when Bill O'Brien, Hall field engineer, was consulted. The main trouble in the washing process arises when iron pyrites in the coal come in contact with air and water. Sulphuric acid is formed, and plays hob with the equipment. Drawing on his experience with similar situations, Bill prescribed treatment of the wash water with Banox* corrosion inhibitor. Maintenance has already been cut in half, unscheduled shutdowns have been eliminated, and further improvement can be anticipated.

Water is your industry's most important raw material. Don't waste it.

Epsom Salt Sales Boom in West

Hall-man Hankison of Denver reveals what associate W. C. Bennett did to keep a client happy.

A new 1500 psig boiler filled with raw water required fast silica reduction. No magnesium compounds were available at the plant for the purpose, so Bennett went to a drugstore and asked the clerk for five pounds of Epsom Salts. The clerk looked startled, the order was repeated, and the sale made.

Only five pounds wasn't enough. So the next evening he returned to the drugstore for an additional five pounds.

This was too much for the clerk, who braced himself firmly, looked Bennett squarely in the eye, and said explosively, "What FOR?"

Lamme Medal Awarded Dr. Hall

The Benjamin G. Lamme medal, one of Ohio State's top honors, was awarded to Dr. Ralph E. Hall at the spring quarter commencement exercises. Dr. Hall received the award for meritorious achievement in engineering.

Said the Ohio State Lantern in announcing the award, "Not only is Dr. Hall credited with the development of water conditioning into an exact science based on sound scientific principles, but his contributions to the entire power industry are considered invaluable. Today the Hall system of boiler water treatment is practically standard throughout the world."

From its founding in 1926, until his retirement in 1950, Dr. Hall was director of Hall Laboratories. He still serves as a consultant to Hall Laboratories on both research and development problems in their work as water consultants to industry.

Dr. Hall is the author of 64 papers, and some 54 patents have been issued on Hall processes. He is a member of the American Chemical Society, the American Society of Mechanical Engineers and two national honorary societies, Phi Beta Kappa and Sigma Xi.

Report Shows Scope of Hall Service

The following extracts from a recent report of Basil Welder, Hall Service Engineer, demonstrates what is meant by "Hall Plant-Wide Water Service." The Hall Service Engineer is not only informed on industrial water but is also alert to the many factors of operation and layout which affect results.

- Persuaded steel plant to make mechanical changes in open-hearth door frames to improve cooling.
- Located leak of clay slip into condensate return system of ceramic plant.
- Introduced Hagafilm* for control of corrosion in condensate return system of glass plant.
- Established system for treating water in five air-conditioning systems in large department store.
- Recommended special filter to plant manufacturing compressed gases, reducing oil in condensate to insignificant level.
- Used Burosil* in boilers of synthetic-fuels laboratory to get rid of sludge through precipitation of magnesium.
- Prepared survey of alternative systems of primary treatment of feedwater for new boilers of steel plant.

Industrial Water Problems Require Special Handling

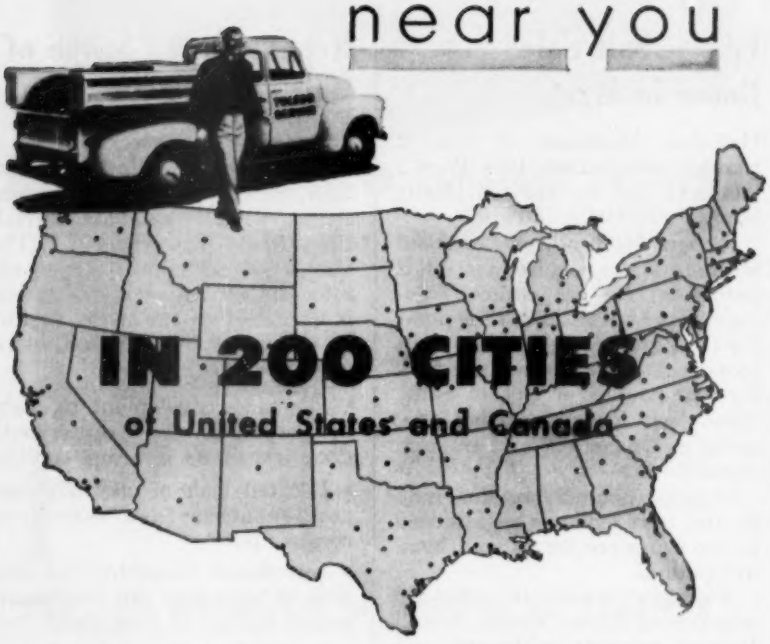
There are no "stock answers" to industrial water problems, for information, write, wire or call Hall Laboratories, Inc.

*"Banox," "Hagafilm" and "Burosil" are registered trademarks. "Hall System" is registered as a service mark by Hall Laboratories.

TOLEDO FACTORY-TRAINED

SERVICE

near you

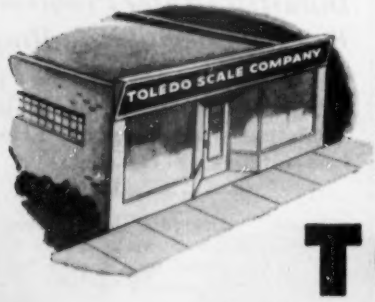


Your scales tell you the essential facts on materials moving into . . . through . . . and out of your plant . . . facts on which COST CONTROL depends!

Neglect is costly because loss through inaccurate weights is added to the cost of repairs and down-time.

Toledo Factory-Trained Service—and *Periodic Inspection*—solve this problem for you! Everywhere, Toledo Service is readily available—as near as your phone in more than 200 cities. Toledo Servicemen have the know-how and specialized tools and equipment to perform your work rapidly and accurately.

Write for bulletin 3913—learn how a Toledo Service Agreement for regular inspection will help you guard costs. Toledo Scale Company, 1209 Telegraph Rd., Toledo 1, Ohio.



Near you is a Toledo sales and service office where competent Toledomen can be of help in solving *any* scale problem... whether it's weighing, counting, checking, testing, batching or force-measuring.

TOLEDO®

HEADQUARTERS FOR SCALES

Begins on page 218

honor, our self-esteem. In less healthy people, mentally speaking, it shows often as pride, self-importance, boastfulness, or egotism.

This is plainly a dominant need in America—and elsewhere. We need to think well of ourselves and (perhaps for reassurance) we need other people to think well of us. Look what we go through, just to keep the approval of others: We decorate ourselves carefully and often, washing and shaving, painting and powdering, combing and curling. We spend billions of hours and dollars on dress. We desire and acquire things that show our social standing—bigger cars, better clothes, finer furniture. We discard them when other people don't accept them, not when they wear out. (Indeed, change of styles supports whole industries.)

What is more telling, we even modify our personalities to get the esteem of others. We act more "refined" in public than at home. And our worst traits we hide even from ourselves. Robert Burns, the great Scotch poet, was saying this when he wrote, "Oh, wad some Power the giftie gie us to see oursels as others see us."

5. We need to do work we like. This need is less apparent than the others because, as Professor Maslow points out, not so many of us have unleashed it. We seem too deeply concerned with achieving group acceptance and self-esteem. Though need Number 5 dominates few people, it influences most. We all know obvious examples; salesmen who love to sell, machinists who hurry home to their own lathes. Such folk are capable of extended effort because their work is a pleasure, not a chore. Yet they would be restless in other kinds of jobs, no matter how much praise they got. As for the rest of us, we often turn to hobbies, or evening activities. And if we can't do the things we would really like, we

SERVES MORE LEADING MARKETS THAN ANY OTHER AIR CARRIER

This "Program" Keeps the TV Industry on schedule!

How American Airfreight has improved production for leading electronic manufacturers

To keep assembly lines flowing smoothly, the nation's television industry today specifies airfreight delivery on incoming shipments from distant suppliers. Thus component parts are on hand in the factory when needed and production schedules are promptly met.

What's more, such an airfreight "program" permits more rapid introduction of set improvements—and at the same time eliminates heavy obsolescence costs on component parts that would otherwise be in stock for the discontinued models.

Speak to any of the leading electronic manufacturers—and they'll tell you that the production flexibility resulting from airfreight more than compensates for slightly higher shipping charges. For further information on what American Airfreight can do to improve your business, wire us *collect*—and we'll have a representative in your office promptly. American Airlines, Cargo Sales Division, 100 Park Ave., New York 17, N. Y.

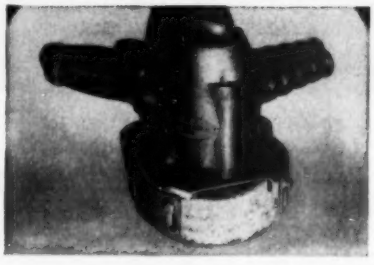
AMERICAN AIRLINES INC.

America's Leading Airline

Dismantling an air tool for regular inspection and maintenance is one way to insure better air tool performance.

Unfortunately, it's also one way to wear out or strip threads in tool housings—and that means re-tapping the holes and using oversize screws, which adds to tool maintenance time and costs.

Fortunately, this can't happen to you—if you're using Buckeye tools—because every threaded hole in Buckeye tool housings has a *replaceable* Heli-Coil insert. That means you always drive screws into a hardened steel thread—so you can't wear or strip threads in the housing—ever.



This, and many other exclusive Buckeye Tools features are completely described in our Air Tools and Electric Tools catalogs. Write for one, or both, today.

What are you waiting for?

Buckeye Tools CORPORATION

DIVISION 13 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Begins on page 218

go watch others do them at the nearest ball park, movie, or concert.

How Practical Is It?

To live fully, to feel safe, to belong, to feel important, to fulfill ourselves. This is the broad handful of needs each of us is trying to satisfy. This is the "formula."

Sounds simple, doesn't it? All we have to do is to give our employees those few things and presto! we have made everybody happy and we have that fine, smooth-running organization — the high morale kind — that we are all after.

Well, it can be done. It's being done. But it's not so simple. There are three complications:

1. These are not things we can hand to people. These are mostly *feelings*. As Jesus said, "Man does not live by bread alone." No organization ever reached top efficiency just by paying a lot. I once refuted two of my "money solves everything" associates in a nasty but effective way. I asked them to pick up their checks in my office. As they took them I remarked, "I wanted to tell you that you've been falling down in your work lately." In the shocked pause that followed, their own feelings were worth a thousand discussions. We are only beginning to realize that, besides proteins and vitamins, people must be nourished with feelings of security and friendship and dignity in order to function well.

2. These needs are not obvious. They are deep within people and we must develop an uncommon awareness of human nature to be conscious of them. We certainly can't ask anyone, "What do you really want?" He does not know, any more than a hungry man generally knows why he's cranky. Yet if you feed him, the crankiness disappears. Maslow points out that all kinds of human crankiness stem from

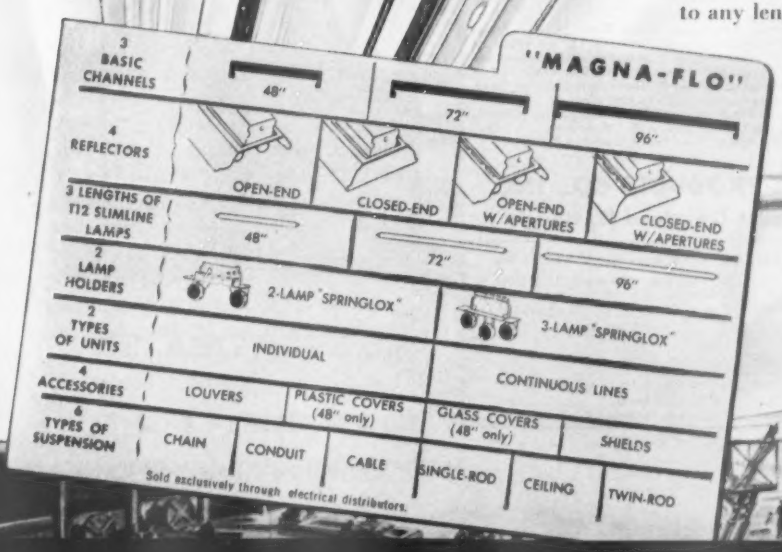
BENJAMIN

Versatile "Magna-Flo" SYSTEMS

go to any length to fit your lighting requirements!

Yes, ONE fluorescent lighting system for all three lengths of T12 Slimline Lamps! It's Benjamin "Magna-Flo" . . . so easily adapted to any size area, any type of location found in industry. No matter where you want fluorescent light . . . high ceilings or low ceilings, assembly lines or drafting rooms, lighting for inspection or mass production . . . whatever the seeing conditions and requirements of the task, there's a "Magna-Flo" System to fill the need exactly. As shown by the chart below "Magna-Flo" is really complete . . . yet so simple to order and specify, because just three channel sizes and four basic reflectors form the backbone of over 300 different fluorescent lighting systems!

Write for Bulletin AD 5705 for complete specification data on Benjamin "Magna-Flo" . . . see how it goes to any length to suit your fluorescent lighting needs!



A Product of Benjamin Electric Mfg. Co., Dept. N
Des Plaines, Ill., makers of famous Benjamin and Leader Line Lighting Equipment and Sound Signals for Industry, Institutions and Commerce.

BENJAMIN "Springlox"—the exclusive "easy-in easy-out" lampholder which reduces maintenance costs and re-lamping time with a patented spring design . . . "Springlox" is standard equipment with all "Magna-Flo" units.

B-207

Sanymetal*

*Trade Mark Reg. U. S. Pat. Off.

better rest rooms

reduce costs 3 ways

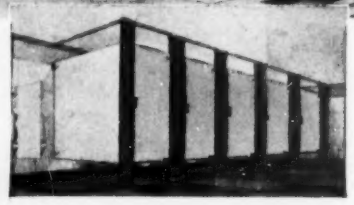
1. They reduce maintenance cost at the rest room and shower room level.
2. They reduce the loss of employees' time in using such facilities.
3. They indirectly help to reduce production scrap.

Sanymetal offers several types of toilet compartments and shower stalls suitable for different types of industrial buildings. All types are available in Two Full Purpose Metal Base Materials which combine colorful attractiveness with long years of service life. These materials are highly corrosion resistant. One of them is the ageless and fadeless rust-proof material . . . Vitreous Porcelain on Steel.

Write for Cat. No. 90 which offers ideas for reducing maintenance and non-productive time costs.

Sanymetal Century Type Ceiling Hung Toilet Compartments are particularly appropriate for industrial rest rooms. When combined with wall-type plumbing fixtures the cost of day-to-day maintenance can be reduced to an all-time low because there is nothing to interfere with the floor cleaning procedure.

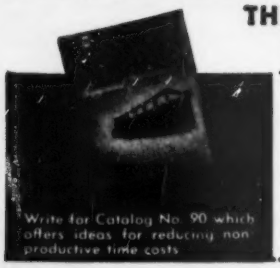
Sanymetal Academy Flush Type (Overhead Brace) Toilet Compartments are the most popular floor supported type toilet compartments for industrial installations. This type makes a strong, sound, distinctive installation and is suitable for remodeling purposes.



Sanymetal Academy Flush Type Shower Stalls provide suitable shower facilities for all types of industrial plant shower installations. This is just one of several types of Sanymetal Shower Stalls, all of which are available in Vitreous Porcelain on Steel, the ageless and fadeless material, or "Tenac"—synthetic enamel baked on over Galvanized, Bonderized* Steel. (*Treated with "Bonderite", a product of the Parker Rust Proof Company).

THE SANYMETAL PRODUCTS CO., INC.

1707 Urbana Road • Cleveland 12, Ohio



Write for Catalog No. 90 which offers ideas for reducing non-productive time costs

THE SANYMETAL PRODUCTS CO., INC. • 1707 Urbana Road, Cleveland 12, Ohio

We are interested in ideas for reducing non-productive time costs and day-to-day maintenance costs of rest room and shower room facilities. Please send Catalog No. 90 promptly.

Name .....

Position .....

Company .....

Street ..... City and State .....

Please attach coupon to your business letterhead.

Begins on page 218

"hungers" — the five built-in needs. Finding and feeding the mental needs is, unfortunately, a much harder and subtler job than cooking.

3. Some people are very hard to satisfy. They may be chronically suspicious, or cold-fish, or loud-mouth. Nothing you do for them seems to help. These men and women are sometimes serious problems in an organization. Their feelings of unhappiness and discontent are catching.

Yet we must handle these unfortunates more with sympathy than hate. They're sick. They are suffering from early starvation of these same basic needs! A new born child wants not only life but safety, not only food, but company and friendliness.

It's the people who didn't get their spirits fed, especially in those earliest years, who are now the misfits in and out of industry. Their childhood needs were never satisfied and they never outgrew their childish feelings.

That suspicious, distrustful guy may be the product of an unhappy home, where loud words, slamming doors, or a trembling mother unnerved him from birth. He never felt safe and likely never will.

That cold, calculating character may still be wearing the shell he crawled into when he was raised in a loveless family. The loud-mouth is probably still trying to get the attention and the feeling of importance his folks denied him.

Rarely — all too rarely — the opposite kind turns up; the man (or woman) to whom titles, plaudits, and fine possessions do not matter; who would rather give credit than take credit; who, though he truly likes people, can walk alone if need be; who has reasoned opinions and will stick up for them even if they're unpopular. This seeming exception, apparently free of the deepest human needs, more likely has had his needs fulfilled, somehow,

Quickly removes die blocks from trucks

Saves $30 each truck unloaded

Delivers beams to another building

Automatic delivery of core sand

Automatic transfer of slasher beams

Stacker crane increases storage by 60%

a 16 mm movie that discusses handling problems common to every industry

Before you decide upon any material handling equipment, let us loan you "Up and Over". This 16 mm film shows many installations of American MonoRail overhead handling equipment. You will see hand operated to fully automatic systems—one or more that may be particularly adaptable to your operations. The film is educational, interesting, informative and shows the way to economical, safe and time-saving material handling. Your ticket of admission is only a note to us asking for a print. It will help us if you advise the exact date, as close as possible, when you wish to use it.

THE AMERICAN MONORAIL COMPANY

13114 ATHENS AVENUE **CLEVELAND 7, OHIO**

meet the bright new
MATHEWS
LOADSTAR
a spectacular performer in the fine trolley field

★ Complete Loadstar assembly with TB-4351 brackets and X-458 chain.

★ No. 4207J Loadstar wheel, cutaway showing felt and steel seal.

★ Here is a completely new trolley conveyer designed to meet the requirements of the most exacting purchaser. A top-quality precision wheel, the No. 4207 Loadstar is the heart of this rugged newcomer to the 4" trolley conveyer field. Five years of research and development by Mathews Engineers are behind this exceptionally fine trolley which is recommended for the overhead conveying job demanding stamina and continuous trouble-free performance. Write for Bulletin LS1, announcing and describing this new trolley.

MATHEWS CONVEYERS

GENERAL OFFICES . . . . . *Mathews Conveyer Company*
ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIVISION . *Mathews Conveyer Company West Coast*
SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . . . *Mathews Conveyer Company, Ltd.*
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

MCC

Begins on page 218

as he grew. He is a rare guy. You'll find someone like him sparking every organization that has top morale.

TESTING THE THEORY • We put our theory to a test fast enough. That strike was still on.

First thing that impressed us was that it answered our question, "Why do people act contrary to logic?" "Because," it pointed out, "we, the people, are not primarily logical." Our feelings come first. *We are logical only to the extent our feelings let us be.* This was a shocker. It took us awhile to face it. After all, our need for self-esteem makes us need to be logical, superior mortals, far above the frailties of others. But a little thought convinced us. That must be why people reach opposite conclusions from the same facts, as in politics, religion, labor troubles, family squabbles, even scientific theories. That must be why the best speakers, advertisers, salesmen are those who appeal to our feelings, not those who give the most facts.

What were the needs of our strikers—needs that aroused such desperate feelings and such strong emotions, needs that made logic impossible? We ticked off the possibilities on our fingers.

It wasn't primarily Number 1, the need to live, or Number 2, the need for safety, we decided. Our people were not marginal wage earners, existing on the edge of starvation. Their jobs were reasonably secure, their working conditions good.

We paused over Number 3, the need to "belong." We hadn't done a job here. Our people didn't have strong feelings of loyalty to their company. They didn't feel part of our team. But we wrote this off as the chief cause of their upset. This deep need had been partly supplied by their union. In fact, it was one of the principal reasons the union (and unions everywhere) had taken hold years before. The union was now the cen-

Solve... TOUGH CONTROL and DRIVE PROBLEMS with IR AIR MOTORS

Here is a typical problem. . . . Ingersoll-Rand Air Motors solved this tough control problem in a paper mill. Since steam and acid conditions prevailed, manual operation of digester dump valves was extremely dangerous. These conditions also prevented satisfactory use of electric motors and controls. Size 55SM Air Motors were installed, dumping was controlled from the charging floor 50 feet above the dump valves, and stand-by valve crews were no longer necessary, due to the reliable, trouble-free operation of the Ingersoll-Rand Air Motors.

When wide ranges of operating speeds are desired . . . when instantaneous starting and stopping is needed . . . when the motor will be subjected to frequent stalling and overloads . . . when wet, acid, or explosive atmospheres, or high temperatures make operations too hazardous for direct manual control . . . when expensive and complicated protection devices would otherwise be required . . . when compact motor units are essential . . . and finally, when installation and maintenance costs must be kept low . . . the Ingersoll-Rand Air Motor is the answer to the problem.

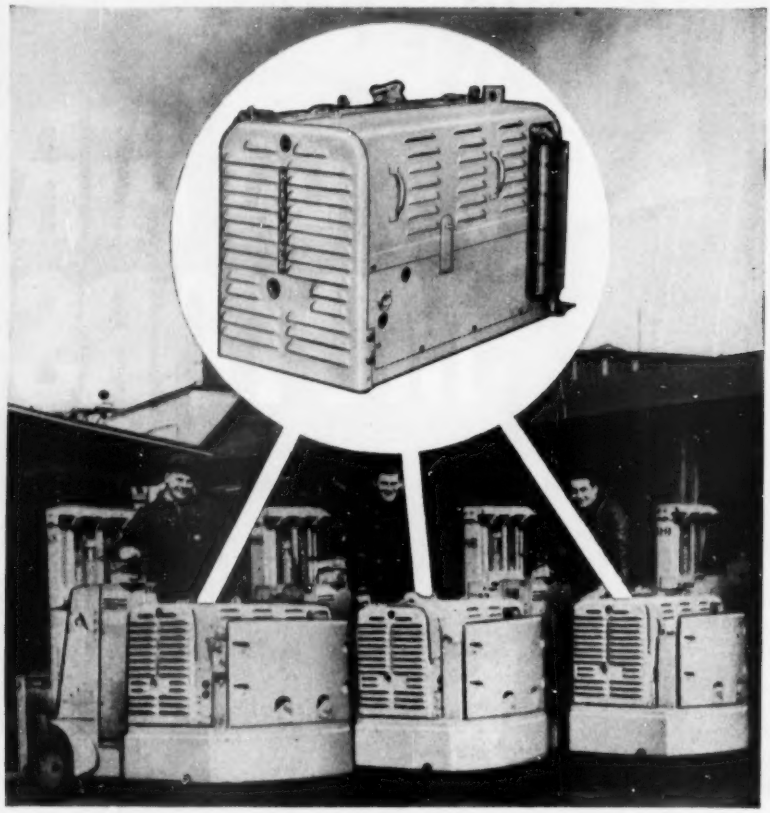
Write, wire, or phone your nearest Ingersoll-Rand branch office for help with your tough control and drive problems . . . or request the new Air Motor Bulletin, Form 5072, which gives full information on over 110 sizes of Air Motors . . . both Piston and Multi-Vane types . . . speeds from 5400 to 19 r.p.m. . . . from 1 to 24 H.P. . . . or request information on fractional horsepower Air Motors.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 836-B

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

Ready-Power is the only Interchangeable gas-electric power unit



Interchangeable Ready-Power units allow the most simplified and economical system of preventive maintenance known, with *no truck downtime!* One spare power unit permits rotation of maintenance operations while trucks stay "on the job" . . . an important reason why Ready-Power automatic electric drive moves materials at lowest cost per ton mile!

AND CONSIDER THESE ADDED FEATURES . . .

- **ONLY READY-POWER has a manufacturing know-how backed by more than a quarter-century of experience in building gas-electric power units.**
- **ONLY READY-POWER offers Diesel-electric power units for electric industrial truck operation.**
- **ONLY READY-POWER has a complete range of sizes in both gas-electric and Diesel-electric power units to meet the requirements of all sizes and types of electric industrial trucks.**

CONTINUOUS-DUTY POWER UNITS

The READY-POWER Co.

3820 Grand River Ave., Detroit 8, Michigan

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

Begins on page 218

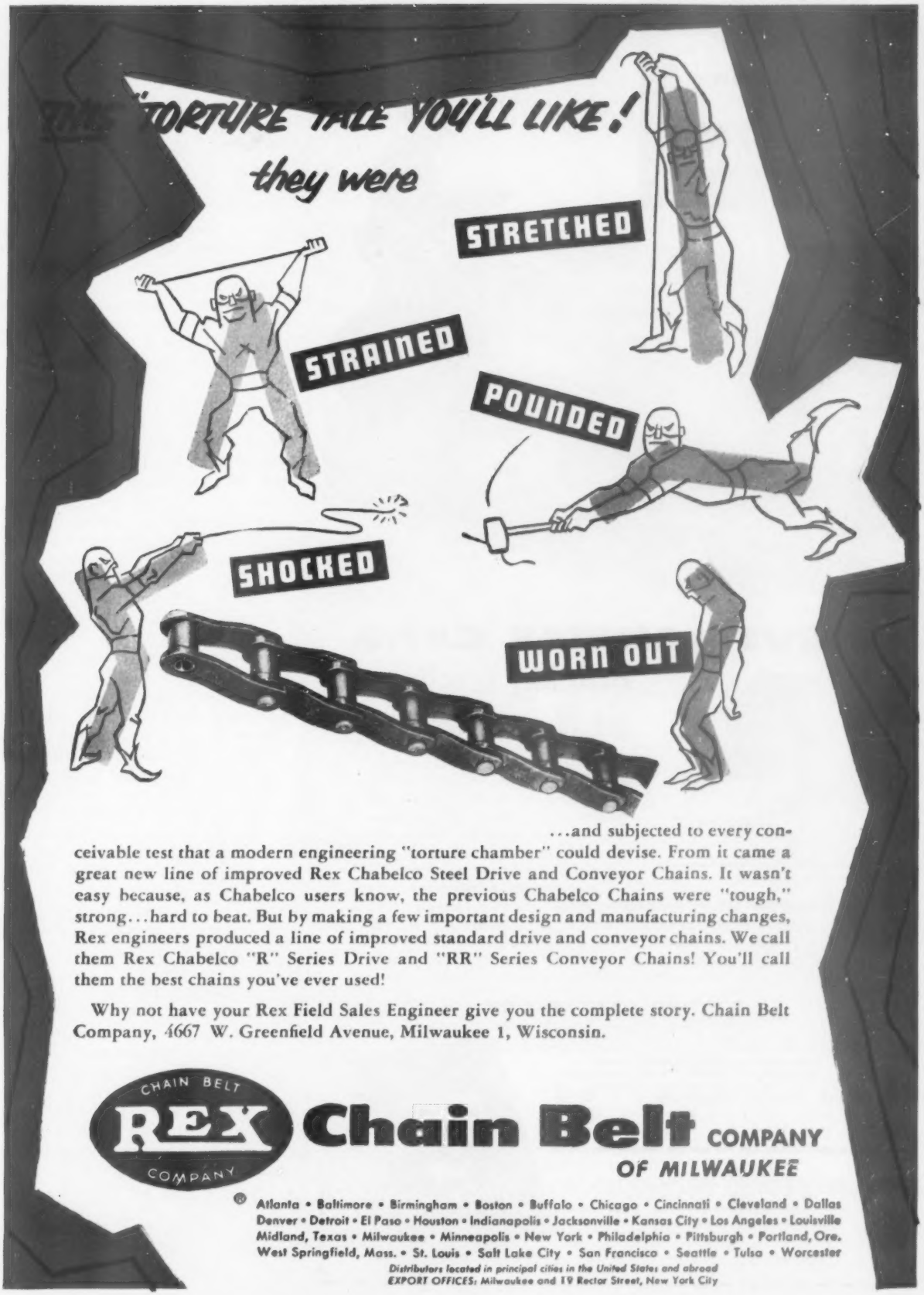
ter of most of those wonderful feelings of loyalty and teamwork engendered when need Number 3 is met. These feelings were helping to hold the strike together. But we felt that our people's needs for Number 3 had not been severe enough to start the ruckus.

That left Number 4, the need for esteem, importance, dignity, as the most likely upsetting factor. Frankly, we couldn't see the connection at first. Here were hundreds of people marching around outside our windows asking for more money. It wasn't too hard to look through these demands to find food, shelter, and safety needs. But only slowly did we come to understand that their need for self-esteem—their pride—was deeply involved.

That strike was a reaction to years of frustration — the war years — caused by comparison of of their own pay with war-plant pay. And by the galling restrictions of the wartime Wage Stabilization Board.

That strike was a "You-can't-do-this-to-me" strike, a "We're-just-as-good-as-anybody-else" strike, a "We'll-show-you" strike. The demand for money was mainly—as money so often is today—a demand to be treated just as well as those other guys in war jobs. Of course the wages of "those other guys" were undoubtedly exaggerated in our people's minds, and the WSB and OPA restrictions were serving an important purpose in fighting inflation. That strike was not a logical strike.

Was there anything the management could do? We couldn't afford to pay. We *could* try to soothe their feelings. Above all, we could keep the argument from becoming personal. We caught on to the fact that feelings can become terrifically intensified when they get focused on a specific person or persons. So our instructions went out to the executives who had to cross the picket line. "Stay friendly. Keep this on a



...and subjected to every conceivable test that a modern engineering "torture chamber" could devise. From it came a great new line of improved Rex Chabelco Steel Drive and Conveyor Chains. It wasn't easy because, as Chabelco users know, the previous Chabelco Chains were "tough," strong...hard to beat. But by making a few important design and manufacturing changes, Rex engineers produced a line of improved standard drive and conveyor chains. We call them Rex Chabelco "R" Series Drive and "RR" Series Conveyor Chains! You'll call them the best chains you've ever used!

Why not have your Rex Field Sales Engineer give you the complete story. Chain Belt Company, 4667 W. Greenfield Avenue, Milwaukee 1, Wisconsin.

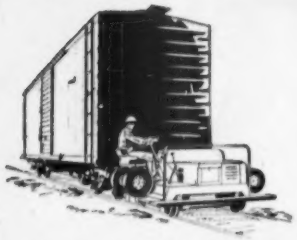
CHAIN BELT REX COMPANY

Chain Belt COMPANY OF MILWAUKEE

Atlanta • Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • El Paso • Houston • Indianapolis • Jacksonville • Kansas City • Los Angeles • Louisville Midland, Texas • Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh • Portland, Ore. West Springfield, Mass. • St. Louis • Salt Lake City • San Francisco • Seattle • Tulsa • Worcester

Distributors located in principal cities in the United States and abroad
EXPORT OFFICES: Milwaukee and 19 Rector Street, New York City

MOVE RAILWAY CARS quickly, easily ... at low cost!



Moves Box Cars, Tank Cars, Gondolas Flat and Hopper Cars!

Get fast, flexible lower cost car moving with the Whiting Trackmobile! It's always ready for spotting, switching or hauling. It travels on road or track, changes from one to the other in half a minute, moves from job to job without delay. The Trackmobile requires only one operator, handles easily with automotive type controls, and employs a special hydraulic jacking action on the mated couplers to develop a maximum draw-bar pull of 8400 pounds! It frees larger locomotives for other tasks, helps reduce work crew waiting time, cuts demurrage and outside switching costs . . . keeps cars, materials and men on the move! Get complete information today!

WHITING CORPORATION
15689 Lathrop Avenue, Harvey, Illinois

Other Whiting Equipment to Speed Handling—Overhead Cranes, Trambeam Overhead Handling Systems, Electric Chain Hoists.

PROVED ON THE JOB! "Reports From the Field on Trackmobile Savings and Advantages" shows actual Trackmobile dollar benefits . . . ask for your copy today!

Begins on page 218

business basis. We're not mad. We'd like to help them but we can't."

Did that cure the strike? No. You don't often change in a few weeks feelings that have been developing for years. Especially feelings that are obviously connected with the deep sense of inadequacy — deep unsatisfied needs for self-esteem, which most of us seem to have.

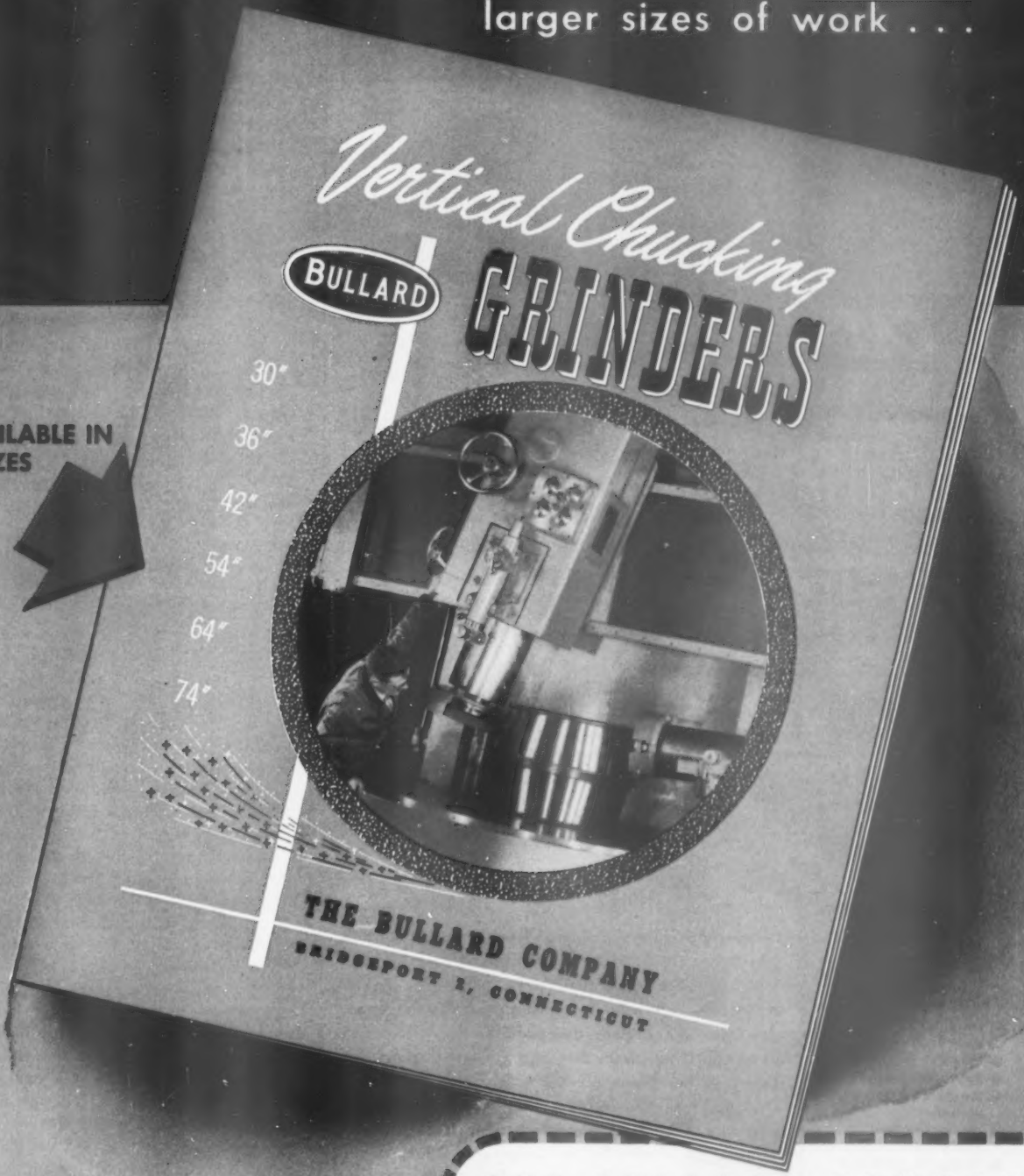
But when the OPA went out 9 long weeks later and we could settle, Theodore Kheel, our mediator, told us that he had never seen such good relations across the bargaining table. There was no hate, no dirty words. There was no sabotage, no "getting hunk" when the plant re-opened. ("Getting hunk" is almost always a sign of outraged pride and self-esteem.)

It's funny about those five key points. We started by checking them off one by one when we were getting to understand our labor troubles. We learned a lot. Then we began to analyze individual grievances. As we got down to cases, we learned more. Soon we found ourselves thinking about our associates in the same way. By this time we weren't counting on our fingers any more. This way of understanding people was becoming second nature—second nature because we were beginning to recognize these needs in ourselves. The little story below is an unglamorized, routine example.

ONE MAN'S STORY • One of our spring assembly departments has a bottleneck job—baling. The springs are compressed to one-tenth their normal volume, sixty to the bale. It's heavy work. If one of two balers is ill, we must replace him or the whole department grinds to a stop, choked by unbaled springs.

One winter we had only one strong and experienced spare man. The day we needed him his "arm was sore." The whole de-

. . . for today's requirements on the larger sizes of work . . .



AVAILABLE IN 6 SIZES

USE THIS COUPON FOR YOUR COPY

THE BULLARD COMPANY
286 CANFIELD AVE.
BRIDGEPORT 2, CONNECTICUT

Please send me a copy of the . . .
"BULLARD VERTICAL CHUCKING GRINDER CATALOG" today

NAME _____

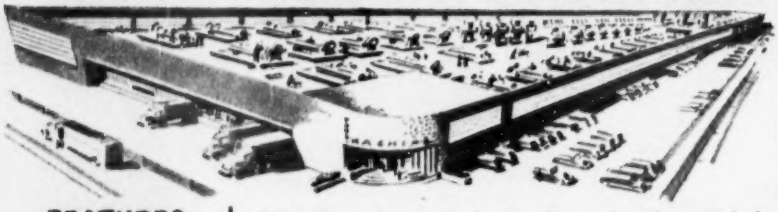
COMPANY _____ POSITION _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

CM METEOR WIRE ROPE ELECTRIC HOISTS
Capacities: ½ to 5 tons

OVERHEAD SPACE could raise PLANT EARNINGS



FEATURES

that make the METEOR preferred by Production Executives

- Only 110 volts at push button control
- Low headroom
- Balanced design
- Single and two speed models
- Motor thermal protection
- Compact, enclosed construction
- Safety type hook blocks
- Airplane type cooling
- Helical gears for long life
- Precision bearings

Getting maximum production from already crowded schedules calls for most efficient use of floor space... and overhead space too. That's where CM Meteor Hoists offer real help. By moving materials overhead, you can take better advantage of floor space for production operations and attain greater speed and safety in handling. Worker efficiency is improved. Designed for continuous duty even under dusty, moist, steam or acid fume conditions dependable Meteor performance keeps production flowing smoothly. Available with plain, geared or motor driven trolleys.

METEOR Catalog No. 142 shows all details of hoist suspension, operation and construction. Sent on request. Prices included.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
DISTRICT OFFICES: NEW YORK, CHICAGO, CLEVELAND

Begins on page 218

partment had to stop. When we needed him again a week later, we got the same story. This time his foreman had strong evidence that his arm wasn't sore at all!

In the old days, our tendency would have been to give this man an ultimatum: "Work the baler or get out." With our new understanding, however, we saw a little deeper.

We realized that no man would give up important satisfactions to his Number 3 (social and love) need lightly. That is, he would not invite the ill-will of his fellow-workers, and his management, unless he was driven by a stronger need. If, we reasoned, we gave him an ultimatum, one of two things would happen. Either he would work or — he wouldn't.

If he worked, driven by needs Number 1 and Number 2 (life and safety), he would still be dissatisfied.

If he were fired, we might really arouse a sleeping giant. Every man in the department would feel his own job threatened. Every man's Number 2 need might awake. We would experience a sudden reversal of feeling in the department and the union would go all-out to buck the dismissal. Most of you have seen this happen. Even if the dismissal went without a hitch, we would have lost a useful employee.

We saw that an ultimatum would be an unsatisfactory solution in any case. We kept it for a last resort. Instead, we asked the foreman to talk it over with the man. (Maslow's Theory is a household word to our foreman.) No soap. Then we asked the steward to see what was eating him.

A little later, the foreman reported with a grin that the man would work. He'd had a grudge with the union for alleged favoritism a year before. His self-esteem was injured. He'd gotten it off his chest, was still a little angry, but would work "for his foreman's sake."

ARO AIR TOOLS
Speed Assembly at SPRAGUE METER CO.

Reversible Screwdriver used in assembling meter housing.

Screwdriver with adjustable clutch drives these screws to correct torque.

Aro hi-torque, slo-speed Screwdrivers and nut-setters mean less bit breakage and better driving control.

Aro Lever-Type Screwdrivers have fine performance records in continuous production.

Aro Electrode Dresser employed in cutting operation

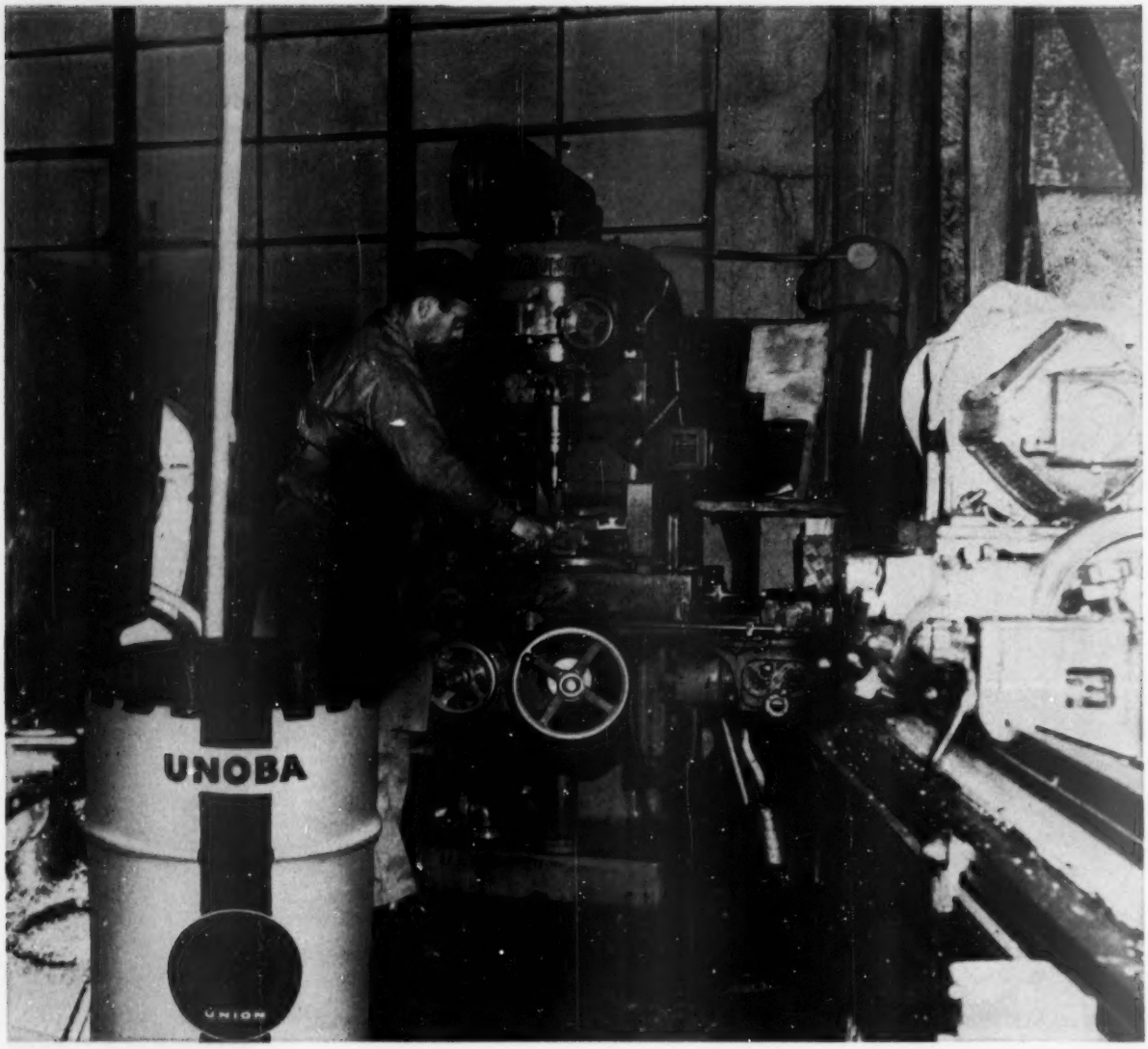
Sprague Meter of Bridgeport says: "*We have been using Aro Air Tools in our Meter Assembly Department for nearly five years. These tools replaced former tools and methods . . . The performance and service have been outstanding. The assistance of your field engineer was invaluable . . .*"

Let ARO help you increase production on jobs of drilling, grinding, polishing, screwdriving and other operations. *Contact your ARO distributor.*

The Aro Equipment Corp., Bryan, Ohio
Offices in All Principal Cities
Aro Equipment of Canada, Ltd., Toronto, Canada

ARO AIR TOOLS

Also . . . LUBRICATING EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS



UNOBA cuts costs & inventories

Multi-purpose UNOBA grease is the money-saving lubricant you need in your plant.

SOLVES INVENTORY PROBLEMS. This *one* grease, UNOBA, does the work of as many as *seven* different greases.

CUTS REPLACEMENT COSTS. UNOBA completely protects your machines and equipment. UNOBA reduces wear, makes equipment last longer.

LUBRICATES UNDER UNUSUAL CONDITIONS. UNOBA resists temperatures from below freezing to over 300 degrees F. UNOBA resists steam and boiling water.

Try UNOBA. Your own experience will prove that UNOBA can save you time and money.

OFFICES: LOS ANGELES: Union Oil Building • NEW YORK: 45 Rockefeller Plaza • CHICAGO: 1612 Bankers Building
CINCINNATI: 2111 Carew Tower Building • NEW ORLEANS: 917 National Bank of Commerce Building

UNION OIL 76 COMPANY OF CALIFORNIA

Makers of T5X—the amazing purple heavy-duty motor oil.

CHANGE ONLY THE CABLE TO INCREASE CURRENT CAPACITY—30—50%

...WITH

ROCKBESTOS A.V.C.®

(N.E.C. TYPE AVA)

When electrical loads outgrow their cables, don't tear out old conduit, then buy and install new. To increase capacity, replace "RH" with Rockbestos A.V.C. (AVA) — the cable that carries more current, size for size.

Not only do you save by putting Rockbestos A.V.C. (AVA) into existing *conduit*, but you make additional savings in labor, copper, and steel.

Used in *new* installations, you wire-in extra-capacity for future load growth, or unusual demands, with this greater-current-carrying cable.

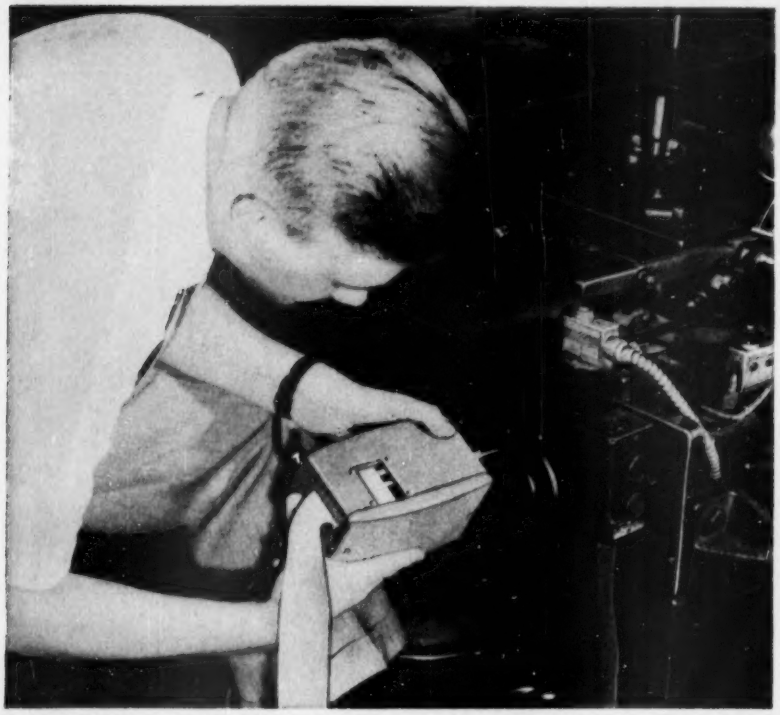
And because it's a better insulated cable, you get more years of dependable service, too. Write for booklet "Cut Current Carrying Costs."

THi ...Your best buy
IT'S THE A.V.C. CONSTRUCTION THAT MAKES THE DIFFERENCE
INNER FELTED ASBESTOS WALL
VARNISHED CAMBRIC
OUTER FELTED ASBESTOS WALL
You can get life-long dependable service under severe operating conditions because these walls of impregnated felted asbestos permanently resist heat and moisture, mechanical damage and effectively seal the high dielectric varnished cambric tapes from deterioration.

ROCKBESTOS

PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT
NEW YORK • CLEVELAND • DETROIT • CHICAGO
PITTSBURGH • ST. LOUIS • LOS ANGELES
OAKLAND, CALIFORNIA • NEW ORLEANS • SEATTLE

PRODUCTION INSTRUMENTS



G-E VIBROMETER RECORDS PUNCH-PRESS VIBRATION; GUARDS AGAINST BREAKDOWNS.

Vibrometer Price* Reduced 39%

Extremely versatile, General Electric's recording vibrometer is especially valuable in production testing, and installing and maintaining rotating equipment.

NEW LOW PRICE $265.20*

Because production-line manufacturing, necessitated by increased demand, has lowered production costs, General Electric now offers its portable recording vibrometer at only $265.20*.

HIGHLY VERSATILE

Two chart speeds are available; 1 inch per second, and 3 inches per second. The G-E recorder measures frequencies ranging from 10 cps to 120 cps, with a 0 to 20 G acceleration range. The vibrometer is accurate to within 5 per cent and measures amplitude from 5 to 125 mils.

EASY TO USE

The G-E recording vibrometer is particularly easy to operate. Because it makes a permanent record of vibration characteristics, accurate records can be kept of equipment that requires frequent inspection. Wave shape, frequency, and displacement of vibration is amplified and transferred to a waxed paper chart. This permanent record is then available for vibration analysis of the equipment.

CHECK COUPON FOR BULLETIN

Bulletin GEC-853 describes General Electric's complete line of vibration measuring equipment in detail.

GENERAL ELECTRIC

G-E Hand Pyrometer Provides Users with a Highly Versatile Temperature-indicating Tool

General Electric's easy-to-use hand pyrometer is designed to:

. . . Measure temperatures of surfaces, liquids, gases, and molten metals.

. . . Eliminate the necessity of locating many separate thermocouples.

. . . Obtain intermittent readings.

. . . Eliminate the need for personnel trained in the use of complicated measuring devices.

Easily portable, the G-E hand pyrometer provides a convenient and time-saving means of checking temperature during such processes as preheating metals for welding, plastic molding, die casting, core baking, sand casting, clayware drying, and many others. Easily checked for proper temperature are such surfaces and materials as field coils, bus bars, cables, resistors, contactors, bearings, commutators, rubber, plastics, waxes, liquids, oil, grease, molten metal, and steam lines.

Jet-turbine wheel is checked with General Electric hand pyrometer during welding, to assure maintenance of proper temperature.

For more complete information, contact your nearest G-E representative, or check coupon for Bulletin GEC-836.

FOR TESTING AND INSPECTION

LABORATORY CUTS TEST TIME WITH G-E HI-POT TESTER. NO CAGES OR TAPE NEEDED.

Bendix Aviation Uses G-E Hi-Pot Tester To Maintain Quality and Cut Test Time

The Pacific Division Development Laboratories of Bendix Aviation Corporation, Burbank, Calif., develops and manufactures equipments for the electronic and aviation industry. To assure quality products, they use General Electric high-potential testers. R. M. Combes, Chief Engineer at the Laboratory, says, "The product is used to maintain quality control, for continuity and good soldered joints. It measures breakdowns as far as wiring and switching relays, and stability of relays are concerned; and in production it is a standard piece of test equipment to maintain quality."

MINIMIZES TESTING HAZARDS

Because the output current of the G-E tester is limited to a maximum of 5 milliamperes, no barriers, cages, or white tape are needed while testing.

BULLETIN AVAILABLE

Price is $226.20*. For further information, check coupon for Bulletin GEC-700.

G-E THERMOCOUPLE VACUUM GAGE

Micron Pressures Easily and Accurately Determined with Thermocouple Vacuum Gage

- Measures 1 to 200 microns and 1 to 500 microns of mercury.
- Provides continuous vacuum indication.
- Used with either glass or metal systems.
- Simple to operate—only one adjustment.
- Operates on 115 v. a-c, or batteries within the case.
- Disconnects without losing vacuum.

For further information check coupon for Bulletin GEC-385.

G-E Zahn Viscosimeter Aids Manufacturer in Controlling Proper Paint Film Thickness

Paint samples are tested at Fedders-Quigan Corporation with General Electric Zahn Viscosimeter to assure uniform viscosity.

Fedders-Quigan Corporation, Buffalo, N. Y., manufacturer of heaters and room air conditioners, has found the General Electric Zahn viscosimeter to be a valuable aid in controlling paint viscosity. Use of the instrument assures proper film thickness of sprayed or dipped paint. Mrs. Beatrice Short, their laboratory Supervisor, says, "The G-E viscosimeter is simple to use, and provides good quality control for paint film thickness."

The G-E Zahn viscosimeter is useful to control the viscosity of varnish, lacquer, japan, oils, and other liquids.

Check coupon for Bulletin GEC-339.

*Manufacturers suggested retail price.

Section B605-48, General Electric Co.
Schenectady 5, N. Y.

Please send me the following bulletins:

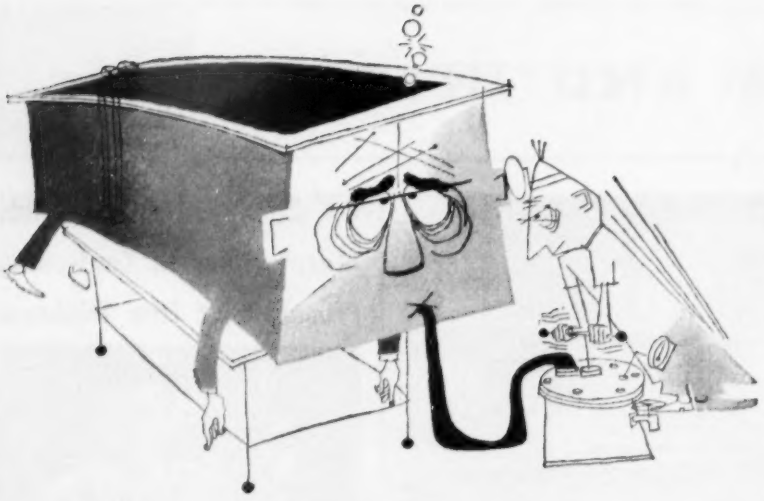
- ☐ Recording Vibrometer (GEC-853)
- ☐ Hand Pyrometer (GEC-836)
- ☐ High-potential Tester (GEC-700)
- ☐ Zahn Viscosimeter (GEC-339)
- ☐ Thermocouple Vacuum Gage (GEC-385)

NAME.....

COMPANY.....

STREET.....

CITY..... ZONE..... STATE.....



has **coil-itis*** cramped
your production flow?

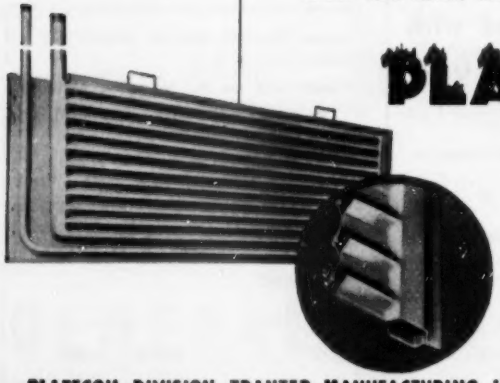
It's a waste of costly time to pump out the solution every time your process heating and cooling tanks get indigestion due to pipe coil troubles. You can save this cost and eliminate production bottlenecks by replacing the pipe coils with Platecoils. Platecoils can be removed and replaced **without dumping the solution.** They simplify maintenance and save hours of downtime. They heat or cool 50% faster and take 50% less space in the tank. As revolutionary as the new wonder drugs, Platecoils cure production troubles involving heat transfer . . . and give profits a shot in the arm.

Write for bulletin P60 today!

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS TRIPLE PRODUCTION

At Continental Motors Corp., 3 crankcase sections can be cleaned at one time when Platecoils are used while only one crank case can be cleaned with pipecoils in the tank. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

*

Coil-itis — Diagnosed as tank heating and cooling problems. **Platecoils** — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, TRANTER MANUFACTURING, Inc., LANSING 4, MICHIGAN

To get these catalogs, circle numbers on coupon, page 128 or 248.

Free NEW CATALOGS

Begins on page 128

8 Motors and Generators
Drip-proof, splash-proof, and totally enclosed (both ventilated and non-ventilated) motors are included in this 12-page catalog on motors and generators. Brochure 100. Electro Dynamic Div., General Dynamics Corp.

9 NEMA Motor Standards
Catalog GEA-5995 on new NEMA motor standards gives frame dimensions for a-c motors, 1 to 30 hp. Includes data on open-type polyphase, single-phase, and wound-rotor motors, as well as totally-enclosed fan-cooled types. 8-pages. General Electric Co.

MATERIALS HANDLING

10 Hydraulic Crane
Here's the story on an indoor-outdoor hydraulic crane. Illustrations show crane mounted either on a truck or tractor, handling a variety of loads. Bulletin AD-2206. 8 pages. Austin-Western Co.

11 Handling Equipment
Boxes and trays, positioning stands, gravity-fed hoppers, and end-loading scoops are among the many types of handling equipment illustrated and described in Catalog No. 83. Helps you select what you need. Features, specs, and capacity data. 12 pages. The Union Metal Mfg. Co.

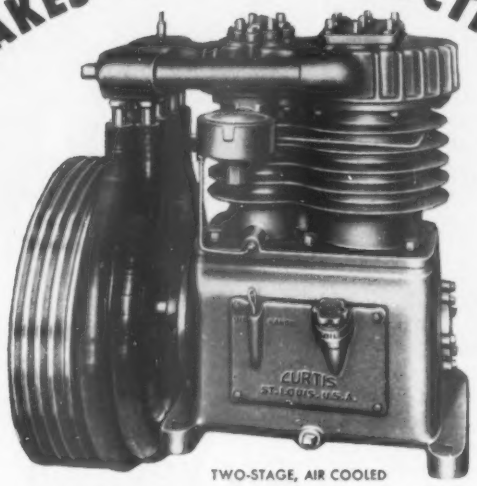
12 Conveyors
Bulletin No. 400 serves as a guide to the selection of package handling conveyors. Diagrams show construction and operation. Dimensions and specs. A. B. Farquhar Co.

Turn the page

Dependable, Efficient

Curtis AIR COMPRESSORS AIR HOISTS AIR CYLINDERS

MAKES YOUR PRODUCTION MORE PROFITABLE

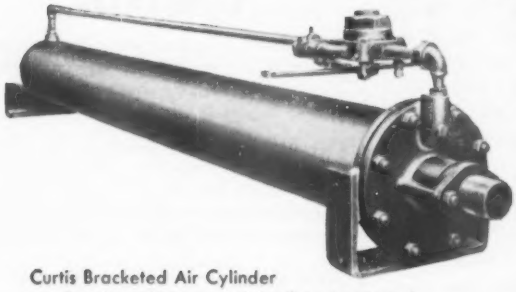


TWO-STAGE, AIR COOLED

PRECISION BUILT COMPRESSORS UP TO 50 H.P.

- Advanced two-stage design saves electric current.
- Delivers more air per horsepower.
- Timken tapered main bearings.
- Pressure lubricated rod and piston bearings.
- Assures long trouble-free performance.

TIME-SAVING Curtis Air Cylinders and Air Hoists



Curtis Bracketed Air Cylinder can be placed in any position from horizontal to vertical. Will lift, lower, push or pull.

- Low-Cost lifting, lowering, pushing, or pulling
- Accurately controlled operating speed
- Cylinders are ground and polished
- Valve is of disc type lapped to its seat.

Curtis Pendant Air Hoist for any lifting or lowering job where headroom is not limited.

FOR COMPLETE INFORMATION and technical data, mail this coupon today . . .

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1995 Kienlen Avenue, St. Louis 20, Mo.
99 Years of Successful Manufacturing Experience

CURTIS PNEUMATIC MACHINERY DIVISION 741
of Curtis Manufacturing Co.
1995 Kienlen Avenue, St. Louis 20, Mo.

I am interested in items checked below:

☐ AIR COMPRESSORS ☐ AIR HOISTS ☐ AIR CYLINDERS

Capacity . . . Current . . . Load . . . Lift . . . Load . . . . . Lift . . . . .

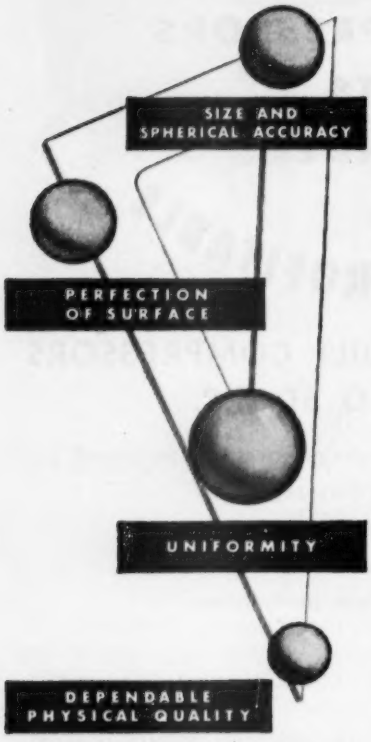
Name . . . . . .

Firm . . . . . .

Street . . . . . .

City . . . . . Zone . . . . State . . . . . .

from any angle



STROM *is your* **BEST BALL BUY**

If you have a metal ball problem, why not let Strom solve it for you. Whether for precision ball bearings or for one of many other ball applications . . . Strom will supply the *right* ball to meet your requirements. For more than a quarter century, industry has looked to Strom for metal balls of unsurpassed quality.

Strom
STEEL BALL CO.
Largest Independent and Exclusive Metal Ball Manufacturer
1849 So. 54th Ave., Cicero 50, Ill.

To get these catalogs, circle numbers on coupon, page 128 or 248.

Free NEW CATALOGS

Begins on page 128

13 Fork Truck
Featured in this 6-page folder is a sit-down-center control, 4000-lb. capacity, battery-powered fork truck. Illustrations of hydraulic hoist and tilt system and components. Dimensional drawings, performance data, and specs. Bulletin No. 450. The Mercury Mfg. Co.

14 Steel Strapping
Two models of power strapping machines are described in Form SS-15 (4 pages). Illustrates machines in operation, suggests uses, gives capacities. The Stanley Works, Steel Strapping Div.

15 Chains
In this 48-page file folder are many illustrations of chain available from maker's line. Includes welded and weldless chain; machine and coil chain (twisted and straight link); truck and flat chain. Also section on hooks, swivels, and other accessories. Specs and physical properties. Hodell Chain Co.

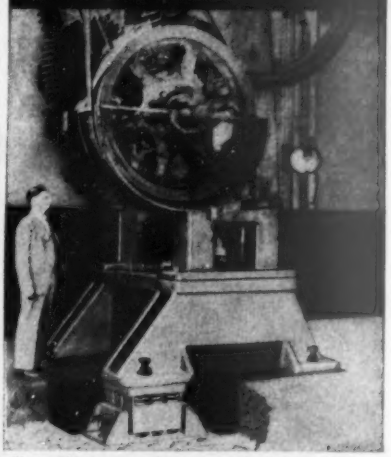
INSTRUMENTS

16 Meters and Controls
Indicators, recorders, and controllers for use in processing are described in this 16-page catalog (No. 18). Tells how to control 15 process variables. Diagrams illustrate control applications. Features and specs. Bailey Meter Co.

17 Orifice Meters
28-page bulletin gives you the story on meters for measuring volume of fluids and gases. Tables indicate orifice plate sizes, capacities, and specs. Rockwell Mfg. Co.

Turn the page

STOP VIBRATION



Huge 600 ton capacity press weighing 100,000# at Hawthorne Metal Products Company, Royal Oak, Michigan. Special 25,000# capacity Korfund Steel Spring Vibro-Isolators installed directly under the press weigh 600# each.

with **KORFUND VIBRATION CONTROL**

Shock from this big press was cracking building walls. To maintain heavy production schedules, this condition had to be remedied — fast.

Korfund's Detroit representative was called in, analyzed the problem, and 'phoned in the important data to the Korfund factory. Korfund engineers immediately started designing and building the special Isolators.

Seven days later, they were shipped!

This press has now been in daily operation for over a year, and shock transmission to the building has been completely eliminated. Yet the 100% effective Korfund Isolators cost less than 3% of the press cost.

For less critical installations, there are even less expensive standard stock Isolators. A Selector Chart is available, giving recommendations for both normal and critical conditions. See our catalog in Sweet's Files, or write us for Bulletin No. 8.

We'll gladly submit recommendations, without obligation. A half century of experience is at your disposal.

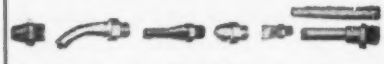
THE KORFUND CO., INC.
48-35C Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

Put air at your fingertips with a Schrader Blow Gun

No. 9325 Drop Forged Stainless Steel | No. 7184 All Purpose Brass Button Type | No. 8785 Forged Brass Lever Type

ADJUSTABLE NOSES

NON-ADJUSTABLE NOSES



Choose the Blow Gun that suits you best from the thirty-six designs and styles of Schrader Blow Guns available. The interchangeable adjustable and non-adjustable noses also available make Schrader Blow Guns the most versatile you can buy.

You'll find there are Schrader Blow Guns that *just suit* any operation you may have . . . blow guns that put air *where* you want it . . . *when* you want it . . . reliably and economically. The #9326 Schrader Blow Gun shown in use above, for instance, will take years of the toughest treatment you can give it. Here's why . . .

It's rugged, both in design and construction. This Schrader Blow Gun is *drop forged* of stainless steel to give you years of trouble-free service. Combine this with its countersunk nose and shielded operating button—and you'll see why it went right back on the job, even after we dropped it out of a tenth-floor window . . . then ran over it with a six-ton truck.

It's convenient—Notice the handy hang-up hook. Hang the gun close to where you need it . . . and remember, too, this hook acts as a safety guard, to help keep hands away from moving machine parts.

It's economical—This Schrader Blow Gun—or *any* Schrader Blow Gun—shuts off tightly the instant you lift your finger. A Schrader Blow Gun delivers air only while it's needed.

And this is only one of many designs and styles of Schrader Blow Guns available to you. At the left, you'll see typical examples of the several blow guns with interchangeable noses that will give you *exactly the blow gun you need.* Get full information by return mail!

Just write—or fill out the coupon below.

Schrader
REG. U. S. PAT. OFF.

products
control the air

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Mail This Coupon Today

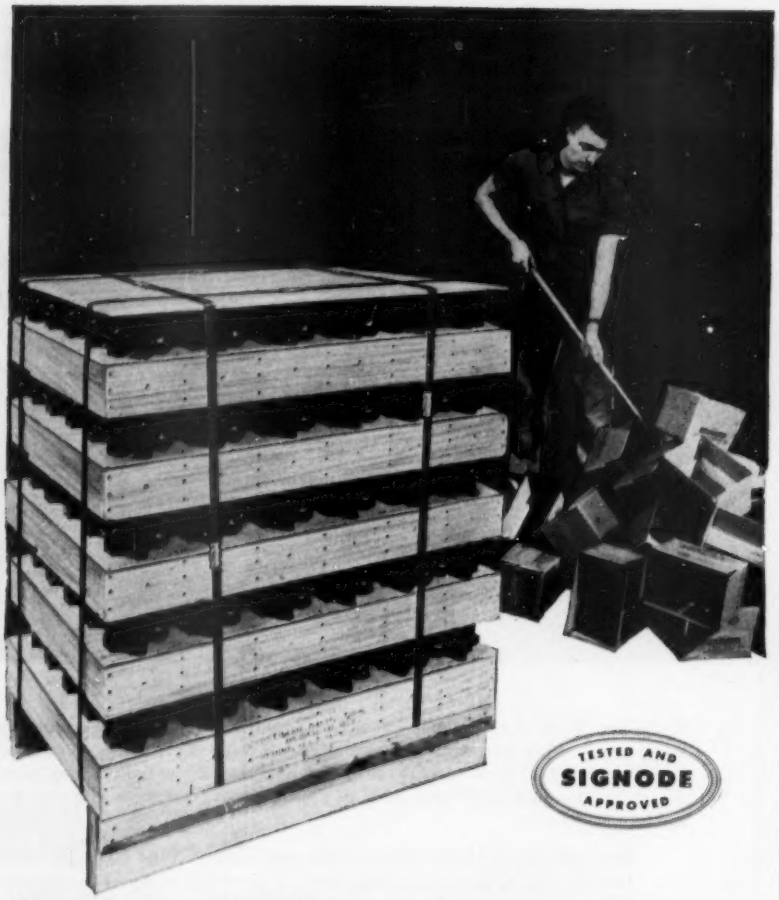
A. SCHRADER'S SON
Division of Scovill Manufacturing Company Incorporated
457 Vanderbilt Avenue, Brooklyn 38, N.Y., Dept. N-6

I am interested in more information on.....

Name_____ Title_____

Company_____

Address_____



How to make 150 containers disappear

Another example of packaging magic that couldn't be performed without Signode Steel Strapping!

The pallet load shown here contains 150 sub-assemblies, nested on returnable wooden trays, packaged for easy handling and shipping by strong bands of tensioned Signode Steel Strapping.

This method of packaging eliminated the use of 150 individual containers, and the materials needed to pack and seal them. Units were handled *once*—at the assembly line, where they were placed on the trays. Strapped to the pallet base, which also served as a tray, the trays became a single, pilfer-proof unit, easily handled by *one* man and a fork truck!

If you now ship by pallet or have products which can be shipped that way, and the economies apparent in this method of product packaging, handling and protection interest you, we will gladly supply detailed facts. Write Signode Steel Strapping Co., 2663 N. Western Ave., Chicago 47, Ill. Offices coast to coast. In Canada: Canadian Steel Strapping Co., Ltd. Foreign subsidiaries and distributors world-wide.

SIGNODE Steel Strapping Co.

SEND FOR FOLDER SHOWING 6 BASIC WAYS OF UNITIZING

To get these catalogs, circle numbers on coupon, page 128 or 248.

Free NEW CATALOGS

Begins on page 128

PIPELINES AND FITTINGS

18 Pumps
Bulletin No. 553 (40-pages) features motor-driven controlled-volume pumps. Illustrations and sectional drawings. Helpful selection guide; capacity-pressure tables. Milton Roy Co.

19 Valves
Here is a 506-page catalog (including a special 24-page indexed selector guide) describing manufacturer's line of steel, iron, and bronze valves. Section on lubricating devices and boiler mountings. The Lunkenheimer Co.

20 Gravity Filters
This 24-page booklet may help you solve your water problems. Here is a line of concrete, steel, and wood gravity filters. Cross-section diagrams and illustrations show typical installations. Operating characteristics, specs, and dimensions. Bulletin No. 2539A. The Permutit Co.

21 Valves
Lubricated plug valves made of steel and semi-steel, for various working pressures from 175 to 800 psi., are described in this catalog (From No. 180). Includes section on remote-control devices, wrenches, locking devices, and other accessories. Photographs and diagrams. Dimension tables and specs. 30 pages. The Ohio Injector Co.

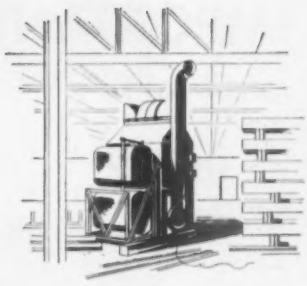
22 Flexible Metal Hose
A comprehensive 48-page catalog of flexible metal hose, fittings, and assemblies. Describes many applications; includes tips on how to install and maintain. Illustrations, engineering data, and specs. No. 200. Titeflex, Inc.

Turn the page

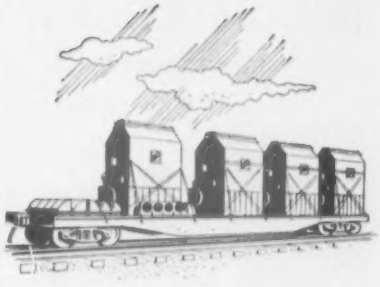
These 12 DRAVO *Counterflo* SPACE HEATERS really got around!

Here's where the Dravo Heater's rugged construction and durability paid off for Ford Motor Company.

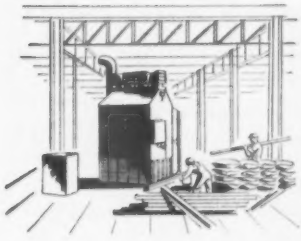
Back in the fall of 1950, Ford purchased 12 Dravo Heaters for temporary heating at Cleveland, Ohio, while Ford's new engine plant was under construction during the winter of 1950-1951.



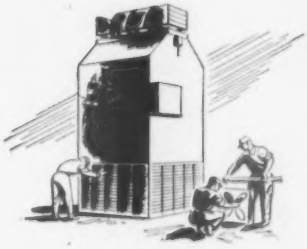
1 The heaters maintained comfortable working conditions and kept the ground from freezing during zero weather so that concrete could be poured.



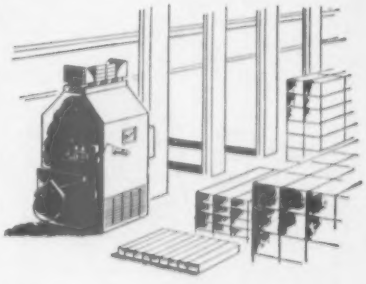
2 After this new plant was completed, four heaters were shipped to Canada and were permanently installed in Ford's warehouse at Winnipeg.



3 The other eight heaters were shipped to Kansas City, Mo., for use as temporary heaters during the construction of facilities similar to those in Cleveland.



4 When that job was finished, the eight heaters were returned to Dravo at Neville Island, Pittsburgh, for overhauling and reconditioning by highly-skilled Dravo personnel.



5 Now these eight Dravo *Counterflo* Heaters have been permanently installed for comfort heating at Ford's assembly plant at Buffalo, New York.

Only Dravo *Counterflo* Space Heaters could stand up under such extraordinary treatment and frequent moving. Dravo Heaters are a product of top-flight engineering and planning; their mill-type, heavy construction means long life, low maintenance and years of satisfactory service.

Dravo Heaters, backed by over 60 years of engineering experience, are available now in a range of sizes from 400,000 to 2,000,000 Btu. Find out how these superior Dravo Heaters can benefit you. Write for more information. Use the coupon.

DRAVO
CORPORATION

PITTSBURGH • ATLANTA • BOSTON • CHICAGO • CINCINNATI
CLEVELAND • DETROIT • INDIANAPOLIS • NEW YORK
ST. LOUIS • PHILADELPHIA • WASHINGTON

Sales Representatives in Principal Cities

Manufactured and sold in Canada by Marine Industries, Ltd., Sorel, Quebec. Export Associates: Lynch, Wilde & Co., Washington 9, D.C.

Dravo Corporation, Heating Department
Dravo Building, Fifth and Liberty Avenues
Pittsburgh 22, Pennsylvania

DRAVO

Send me information about heating for the subjects I've checked, and Dravo Heater Catalog PQ 5-132

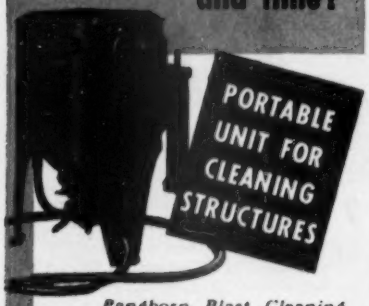
- ☐ Space heating industrial buildings, warehouses, garages, hangars.
- ☐ Stores, schools and auditoriums.
- ☐ Process drying and heat curing.
- ☐ Tempering make-up air.
- ☐ Temporary heating.
- ☐ For use in conjunction with air conditioning.
- ☐ Please have a representative call at no obligation to me.

Name _____ Title _____

Company _____ Address _____

City _____ Zone _____ State _____

Large or small jobs—
PANGBORN BLAST CLEANING
cuts maintenance cost and time!



Pangborn Blast Cleaning Machine—Cleans tanks, bridges, buildings, and other structures quickly and economically. Ideal for maintenance and other jobs, such as removal of dirt, scale, rust, etc. preparatory to painting. Six sizes, stationary or portable, from . . . $188 and up.

Pangborn Blast Cabinet—Saves time and money in cleaning small metal parts . . . removing rust, scale, grime, old paint, etc. Produces smooth, clean surfaces on pieces up to 60" x 35" in size. Models from . . . $319 and up.

Pangborn Unit Dust Collectors—Trap dust at the source. Minimize maintenance, allow reclamation of valuable material . . . $286 and up.

Pangborn Hydro-Finish Cabinets—Remove directional grinding lines, hold tolerances to .0001". Reduce further finishing of tools, molds, dies . . . $1410 and up.

Write for details on these machines to: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

Pangborn
BLAST CLEANS CHEAPER
with the right equipment for every job

Use the coupon below—or the duplicate on page 128 to get these

IMPORTANT NEW Free CATALOGS

Begins on page 128

MISCELLANEOUS

23 Insulation
An 84-page catalog for specifying from maker's line of insulation products. Describes properties, forms, and sizes of each; suggests applications. Engineering data and specs. Owens-Corning Fiberglas Corp.

24 Heat Exchangers Storage Heaters
More than 12 types of hot-water storage heaters and heat exchangers are featured in this 16-page catalog (No. 5). Included are horizontal and vertical hot-water storage heaters, instantaneous water heaters, condensate coolers, and convertors. The Patterson-Kelley Co., Inc.

25 Electrodes
Catalog 1318 is a 50-page handy pocket guide to help you select from over 30 different types of welding and hardfacing electrodes. Describes procedure for welding and application. Air Reduction Sales Co.

26 Water Conditioning
Gives you the story on maker's water softeners (Bulletin No. 611A). Comprehensive data on conditioning water for boiler, process, and general use. Cutaway illustrations and diagrams show action of softener. Elgin Softener Corp.

27 Unit Heaters
16-page catalog describes a group of centrifugal fan-type unit heaters. Illustrations and diagrams of models available. Suggests typical mounting arrangements. Tables and charts list capacities. Airtherm Mfg. Co.

28 Journal Jack
Folder describes maker's 35-ton hydraulic journal jacks. Three models are illustrated. Includes special features and specifications for each. Bulletin AD 29. The Duff-Norton Mfg. Co.

For catalogs 29 through 46, see Plant Engineering Problems, page 250, and Plant Operating Problems, page 254.

DUPLICATE COUPON ON PAGE 128

MAIL THIS COUPON FOR FREE CATALOGS *(Good until Oct. 31, 1953)*

FACTORY MANAGEMENT & MAINTENANCE (August) 1953)
330 W. 42nd St., New York 36

I'm circling the numbers of the catalogs and bulletins I want:

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46						

Name ..... Title .....

Company .....

Street Address .....

City ..... Zone..... State.....

1 Totally enclosed gearbox and end gearing — for sustained accuracy

2 Automatic pressure lubrication — for long life at original efficiency

3 All anti-friction bearings — for peak power and reduced maintenance

4 Hardened, ground or shaved, wide helical gears in headstock — for precision power, easier shifting

5 American Standard Camlock Spindle Nose — for quick, rigid chuck and fixture mounting

6 Flame-Hardened and Precision-Ground Integral Bedways — for sustained accuracy throughout the life of all four ways

7 All critical parts made of hardened alloy steel — for long, trouble-free life

To get Utmost Value OUT OF YOUR LATHE— Buy Series 60 Value BUILT INTO your Lathe

Monarch Series 60 Engine Lathe. Series 60 models are furnished in 13", 16", 20" and plus-swings.

Monarch Series 60 Toolmaker's Lathe. All Series 60 Models are furnished in a wide variety of bed lengths.

Isn't it logical? Aren't the costs and quality of your products directly affected by the sustained accuracy, speed, versatility and dependability of your turning equipment?

So look over the Monarch Series 60 product features listed above (bearing in mind that almost all of them were Monarch pioneered). Check the extra strength, weight and power of the machines, making them, within their rated capacity, fully capable of sustained heavy production. Then look over the wide choice of accessory equipment that lends such versatility to the basic Engine and Toolmaker's models. This includes (with Monarch only!) choice of three types of Tracer Controls — including the Air-Gage Tracer which, with further addition of the Auto Cycle Unit, gives you a fully automatic cycle high production unit.

For utmost lathe value for toolroom, production line or maintenance shop — look into the Monarch Series 60! Let us send our Booklet No. 1113 with complete information. Just write! . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

FOR A GOOD TURN FASTER TURN TO MONARCH

Remember Last Winter?
Those HARD-TO-HEAT AREAS
SOLVE THAT PROBLEM NOW
with

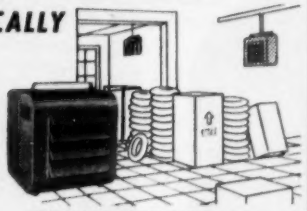
ELECTROMODE

All-Electric UNIT HEATERS

SUSPENSION TYPE MODELS available from 10 to 45,000 watts. Model 14-10 illustrated.

QUICKLY — EASILY — ECONOMICALLY

- Locate wherever heat is needed.
- No piping, flues or fuel storage required.
- Install and heat within one day.
- All current entering unit is converted into heat. No fuel loss en route.
- Models from 1500 to 45,000 watts to fit any heating need.



COMBINATION PORTABLE and suspension type models, 1500 to 7500 watts. Model AN-30A illustrated.

EXPLOSION-PROOF HEATERS for heating hazardous areas subject to explosion. In three sizes: 2000, 4000, 6000 watts. Model CX-2 illustrated.

Completely SAFE! Only Electromode has the cast-aluminum, sealed-in heating element and built-in safety switch. No danger of fire, shock or burn. No over-heating.

Approved by Underwriters' Laboratories

For complete information write:

ELECTROMODE CORPORATION
45 CROUCH ST. ROCHESTER 3, N. Y.

Leader in electric heaters since 1929

Pure zinc or aluminum, molten-sprayed on iron or steel surfaces, provides complete, dependable protection against atmospheric corrosion for upwards of 20 years without further maintenance. Such coatings are *mechanically* bonded to the surface—adhesion is *not* dependent on volatile vehicles or binders. Scaling, crazing, blisters, are eliminated. Protection is positive. "Metallize 'em and forget 'em!"

Why not find out more about how you can forget rust for 20 years or more? For descriptive Bulletin 62B—or the name of your nearest Metco Systems contractor—write or wire.

******Reg. U.S. Pat. Off.*

the Metco* Systems—a series of 18 basic engineering specifications developed over 19 years of experience with pure zinc and aluminum coatings on many different types of structures and equipment. The *Metco Systems* provide for standardization of surface preparation, metal coating thicknesses and organic aftercoatings for various service conditions and appearance requirements.

Metco Systems Dept. F, 38-14 30th Street Long Island City 1, New York

Good Ways to Solve Special PLANT ▶ ENGINEERING PROBLEMS

To get these catalogs, circle numbers on coupon, page 128 or 248.

29 HOW TO PREVENT MACHINE SAG on concrete foundations: Use the Embeco non-shrink method of grouting, says the Master Builders Co., in a 15-page study. The Embeco grout gives you protection against excessive vibration and impact. Expansion is controlled for even bearing.

30 HOW TO CUT THE COST OF TREATING PLATING WASTES: Take a look at ion exchangers to eliminate your complex water pollution problems. The Permutit Co. in Bulletin No. 3865 describes valuable new applications of this method of recovering chemicals. Supplemental data include tables and charts.

31 STOP WASTING MONEY ON HOSE REPLACEMENTS: New tips on use and storage of all types of rubber hose are included in a fast-reading folder of Hewitt-Robins, Inc. Packs a lot of useful information into its four pages.

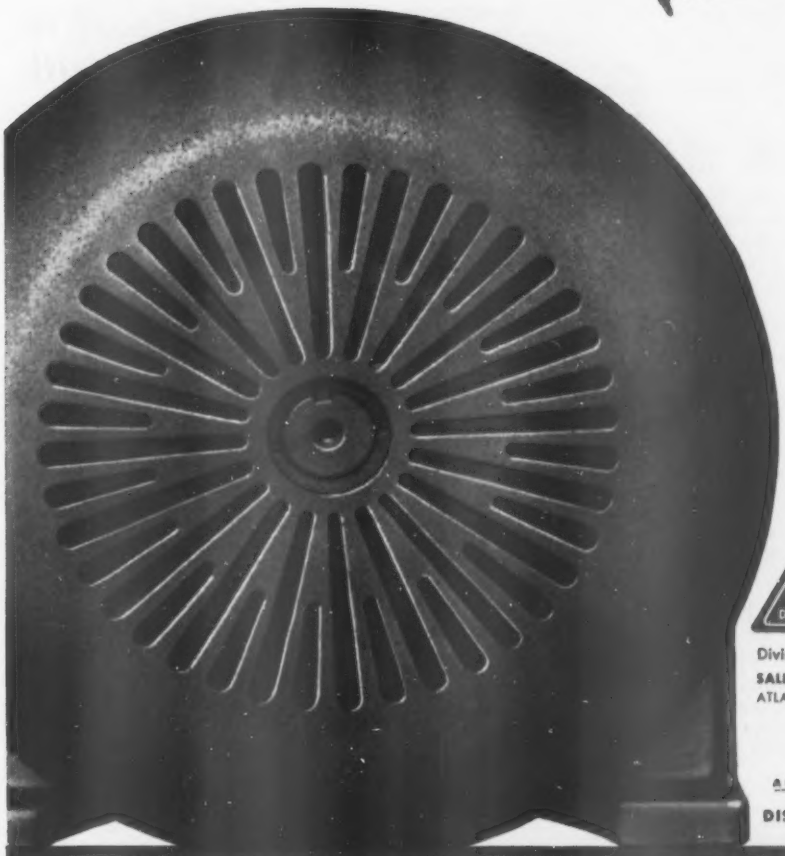
32 WHAT EVERY EXECUTIVE SHOULD KNOW ABOUT pH is the title of Bulletin 92-D of Beckman Instruments, Inc. Helps determine whether you have a pH problem in your plant and shows how pH control can solve many process troubles.

33 HOW TO MAINTAIN ELECTRICAL CONTROLS: Many helpful suggestions on this subject are made in Allis-Chalmers Manufacturing Co.'s new 8-page manual No. 14X7612A. Tells how to overcome most common difficulties with electrical control devices. Contains a handy trouble-shooting chart.

Turn the page

To know you're right... replace with

Delco Motors



You can depend on Delco motors to **keep going** in the face of the severest conditions. They are designed, engineered, and built to precision standards to minimize servicing and down-time.

When you need motor replacements—fast—call for Delco. They're available everywhere through local Delco motors distributors.

There's a Delco
for Practically Any
Industrial Application

Open and enclosed motors up to 100 h.p. for standard foot mountings. NEMA C&D flange-mounted motors up to 30 h.p. Explosion proof motors up to 20 h.p.

DELCO DAYTON OHIO

DELCO PRODUCTS

Division of General Motors Corporation, Dayton, Ohio

SALES OFFICES:
ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DALLAS
DETROIT • HARTFORD • PHILADELPHIA • ST. LOUIS
SAN FRANCISCO

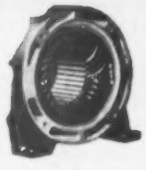
A GENERAL MOTORS PRODUCT — A UNITED MOTORS LINE

DISTRIBUTED BY WHOLESALERS EVERYWHERE

These Features tell you why you're Right with Delco

Water-Tight Conduit Box. Protects against moisture.

Positive Lubrication. Lengthens bearing life.



Delcote Insulation. Permanently flexible, moisture-proof, wear resistant.

Positioned Bearings. Maintain shaft alignment.

Dynamically Balanced Rotor and Shaft Assembly. Reduces vibration.

Corrosive-Resistant Cast Iron Frame. More solid, more rugged.

can't burn out when stalled

Sensationally Different

KELLER Air Hoist

with positive displacement piston-type air motors

VARIABLE SPEED from 0 to 17 fpm permits safe handling of fragile loads. The load hook can be "inched" up or down for accurate spotting.

LIGHTWEIGHT—A 1,000-lb capacity hoist weighs only 30 lb—easy to carry up or down a ladder, and move from job to job.

DUST, FUMES cannot injure an air motor. Nor will it burn out, even if stalled all day long.

LOW MAINTENANCE because of simple design. Only a few working parts, and these are fully enclosed. Two grease fittings lubricate all working parts.

CONTINUOUS DUTY—Keller Air Hoists can be used continuously over periods of hours (or days) without danger of shortening motor life.

SEND FOR DETAILED INFORMATION

KELLER

Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

Begins on page 250

Good Ways to Solve Special PLANT ▶ ENGINEERING PROBLEMS

To get these catalogs, circle numbers on coupon, page 128 or 248.

34 HOW TO LOCATE UNDERGROUND PIPELINES with an electric "divining rod": The Line Locater of Wilkinson Products, Inc., will spot, trace, and indicate the depth of metal pipe or cable, ferrous or non-ferrous.

35 CUT THE COST OF REMOVING OLD, HARD PUTTY in window sash by using a Master Putty Remover made by the H. E. Watkins Co. Used in conjunction with an electric drill, the putty remover will save time for anyone who has to replace broken glass.

36 HOW TO DECREASE POWER DRAIN ON A TRUCK BATTERY: The Monarch Rubber Co. describes in a 4-page folder how the new efficiency solid tire, specially designed for electric-powered trucks, can cut ampere drainage up to 30%.

37 HOW TO INSTALL A SEWER LINE UNDER YOUR PLANT without breaking the floor surface: Tunneliner pipe is the answer, suggests Lamar Pipe and Tile Co. in its 6-page bulletin. Its short, precast, elliptical sections have a length-to-width ratio that permits one section to be passed through the underground sewer already tunneled.

38 HOW TO SAVE ON SURFACE CLEANING MATERIALS: Give your janitorial help the exact amount of cleaner needed for the job. The Ross & Story Products Corp. is putting up its Wall-Kleen Krystals in 2-oz. moisture-proof envelopes.

Turn the page

Protect Against OVERLOADS

...Overloads in Power Drives with

CENTRIC CENTRIFUGAL CLUTCH - COUPLINGS

In addition, CENTRICS provide SMOOTH CUSHION STARTS *without harmful surges of power*

ACCELERATION CONTROL *without vibrating running chatter*

THERE'S A CENTRIC FOR EVERY DRIVE
Fractional to 2500 H. P.

MOTOR TYPE... With the exclusive outer and inner shoes for perfect drive control.

DUAL DRIVE TYPE... With predetermined engagement to permit independent operation of either side of a dual drive arrangement. Works on a centrifugally operated spring controlled shoe principle.

SMOOTH OUT POWER DRIVES WITH CENTRICS

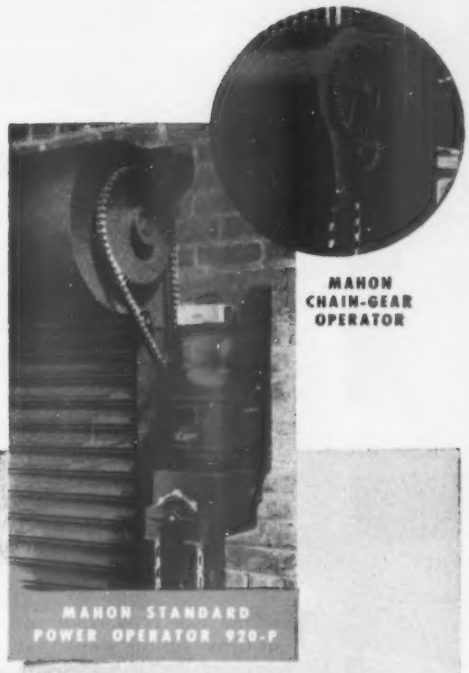
2402

CENTRIC CLUTCH

COMPANY

P. O. BOX 175
MAIN ST. & STATE ROUTE 35
WOODBRIDGE, NEW JERSEY

Rolling Steel DOORS



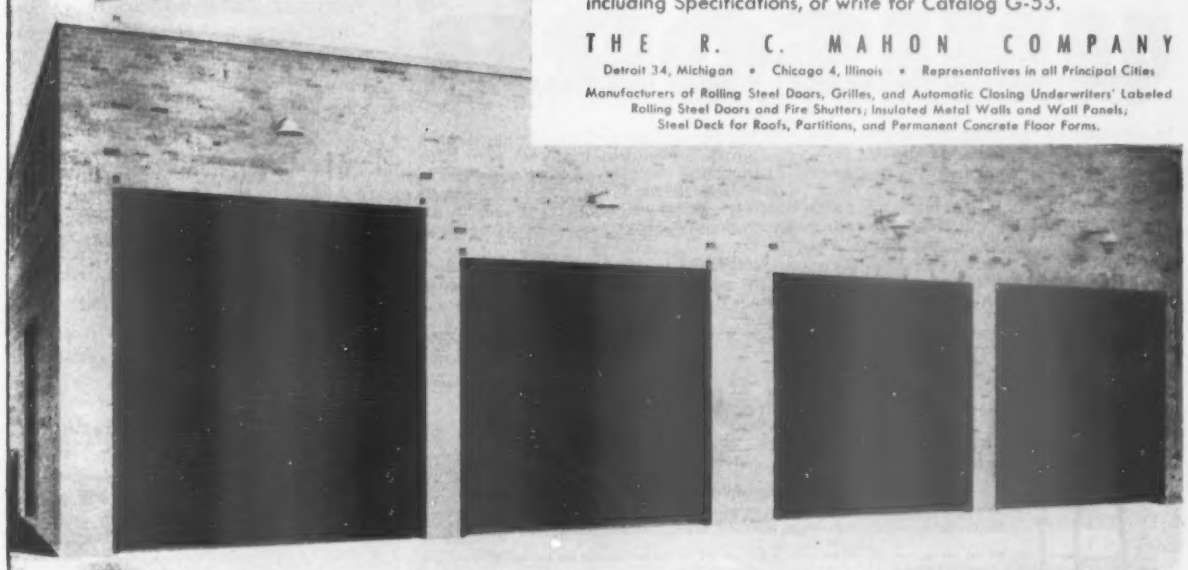
Manually, Mechanically, or Power Operated

A good, quick opening, quick closing power operated rolling steel door meets present-day requirements more fully than any other type of door. The vertical action of its roll-up steel curtain requires no usable space either inside or outside the opening . . . there are no overhead tracks or other obstruction to interfere with crane operations or limit headroom adjacent to the door opening. No other type of door offers these inherent advantages of space economy and compactness in operation . . . in addition, rolling steel doors are permanent—their all-metal construction assures you a lifetime of trouble-free service, and provides maximum security against intrusion and fire. When you select a rolling steel door, check specifications carefully . . . you will find many extra-value features in Mahon doors—for instance, the galvanized steel material, from which the interlocking curtain slats are rolled, is chemically cleaned, phosphated, and treated with a chromic acid solution to provide paint bond, and, the protective coating of synthetic enamel is baked on at 350° F. prior to roll-forming. You will find other material and design features in Mahon doors that add up to a greater overall dollar value. See Sweet's Files for complete information including Specifications, or write for Catalog G-53.

THE R. C. MAHON COMPANY

Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities

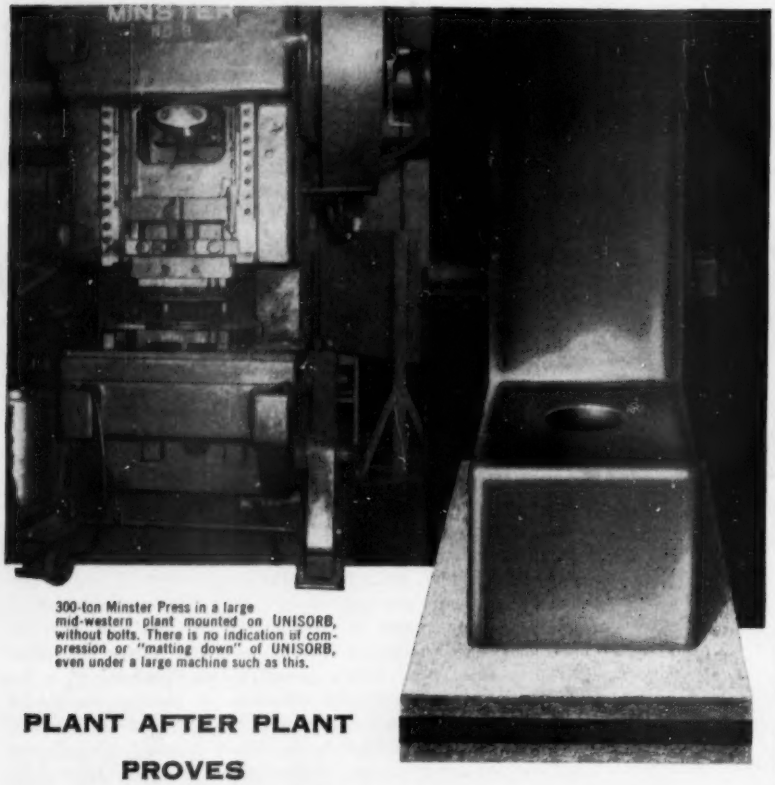
Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs, Partitions, and Permanent Concrete Floor Forms.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Four Mahon Power Operated Rolling Steel Doors installed in truck openings of an enclosed loading dock at Detroit Hardware Company's new plant.

MAHON



300-ton Minster Press in a large mid-western plant mounted on UNISORB, without bolts. There is no indication of compression or "matting down" of UNISORB, even under a large machine such as this.

PLANT AFTER PLANT PROVES THAT MACHINES LARGE AND SMALL SHOULD BE MOUNTED ON

UNISORB®

In addition to reducing transmitted machine noise and vibration up to 85%, UNISORB saves you time and money on installation.

You don't need bolts or lag screws with modern UNISORB machine mounting. No more holes drilled in the floors. You simply order the grade of UNISORB recommended for each machine, cement the pad to the machine base and floor, let the cement set and begin operation.

Return the coupon today for your copy of the book that shows how easy it is to use UNISORB mounting pads. The book also shows how UNISORB reduces transmitted vibration and noise by as much as 85%.

UNISORB is also available pre-coated with adhesive, for use with machines which do not require shimming.

Look for the red center and **UNISORB** brand mark

The **FELTERS** Company

206 SOUTH STREET, BOSTON 11, MASS.

Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.; New York City

RETURN COUPON NOW! At no obligation to me, please send a copy of "Why It Pays to Anchor Machines with UNISORB."

Name..... Title.....
(Please Print)

Company.....

Address.....

City..... Zone..... State.....

Return to: The Felters Co., 206 South St., Boston

Good Ways to Solve Special PLANT ▶ OPERATING PROBLEMS

To get these catalogs, circle numbers on coupon, page 128 or 248.

39 HOW TO LUBRICATE A FORK TRUCK IN 10 SECONDS: Mercury Mfg. Co. can tell you how. Centralized lubrication is built right into its Model 430 truck. All you have to do is feed fresh lubricant into the system through a conveniently located inlet block. Valves accurately control how much lubricant gets to each bearing. Reduces repair and maintenance costs, eliminates chance of error, or forgetting bearings.

40 WHERE COLOR CONTROL IS IMPORTANT, maybe the Gardner color and color difference meter is just what you need. The average production or lab technician can read color differences in three simple steps that take 20 seconds. Gardner Laboratory, Inc., says you can use it for raw material, dyes, paints, pigments, solids, powders, or liquids, tells how in Bulletin No. 131.

41 HOW TO CUT COSTS IN DESCALING HOT-ROLLED STEEL SHEETS: Use airless blasting, says American Wheelabrator & Equipment Corp. You get continuous high-production cleaning without the trouble of acid disposal. No metal lost in pickling. Mechanical method removes only scale.

42 FOR HINTS ON MACHINING TITANIUM, Mallory - Sharon Titanium Corp. has wrapped up its recommendations in an 8-page booklet. It's based on detailed study of various machining operations. Suggestions about tools, tool angles, cutting speeds, cutting fluids to use. Data covers turning, milling, drilling, tapping, grinding and internal grinding, sawing, and reaming.

Turn the page

READY FOR RUGGED DUTY

Maxi-Power Drive assembly for overseas cement mill. This unit, on a special base, has long input and output shafts supported by outboard bearings. The large spur pinion will drive a 20-foot, 18-inch face spur gear.

FOOTE BROS. MAXI-POWER DRIVES

With maximum load-carrying capacity for day-after-day service, Foote Bros. Maxi-Power Drives offer a ready solution for toughest speed reduction applications.

Sturdy, compact Maxi-Power Drives have precision-generated helical gearing — uniform load distribution across the entire tooth surface. Maximum performance is assured for all applications where rugged service is required.

These parallel shaft speed reducers are available in single, double or triple reductions. Ratios range up to 360 to 1 — capacities up to 1,550 horsepower — ideal for slow-speed requirements.

Foote Bros. also offers a complete line of foot or flange mounted drives for both horizontal and vertical applications, and Foote Bros.-Louis Allis Gearmotors, horizontal and vertical.

FOOTE BROS. Duti-Rated LIFETIME GEARING

This Trademark Stands for the Finest in Industrial Gearing

Line-O-Power Drives

Foote Bros.-Louis Allis Gearmotors

Hygrade Drives

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. I, 4545 South Western Boulevard, Chicago 9, Illinois
Please send Bulletin MPB containing full information on Foote Bros. Maxi-Power Drives.

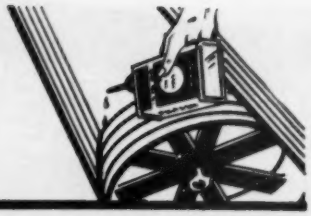
Name.....

Company.....

Address.....

City.....Zone.....State.....

for Maximum Efficiency



TREAT BELTS WITH Beltraction

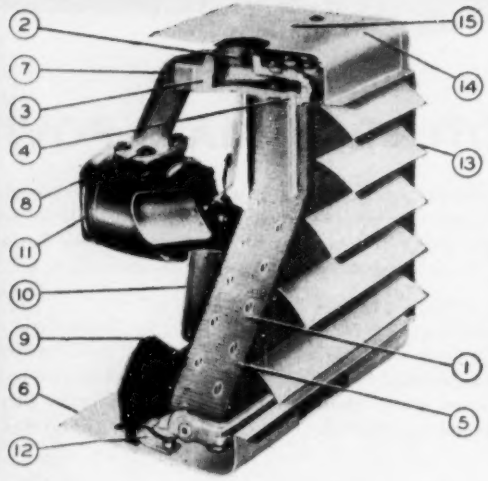
Every Time You Lubricate Bearings!

110,000 users of BELTRACTION Liquid Belt Treatment find that it pays to make it a habit to apply this effective conditioner to belts regularly. Because BELTRACTION increases traction 200 to 500%, it prevents costly delays and breakdowns due to belt slippage. Especially recommended for V-belts. Write for interesting folder "Horse Power Where and When You Need It" which gives results of tests of BELTRACTION by United States Testing Company, Illinois Institute of Technology and other prominent laboratories.

BELTRACTION COMPANY
1823 W. Winona St. Chicago 40, Ill.

FOR ALL TYPES OF BELTS • V-TYPE, FLAT OR ROUND

THESE YOUNG FEATURES MEAN GREATER UNIT HEATER EFFICIENCY



Young Type "SH" Unit Heaters are designed to provide a maximum amount of heat for warming "cold spots," as well as for general space heating applications. They are available in 14 sizes for hot water or steam systems up to 150 lbs. pressure.

The salient design features incorporated in the Young Unit Heater are shown above in cutaway view. 1—Efficient tube-and-fin type heating element. 2—Full size supply and return tappings. 3—Special cast iron used in supply and return headers. 4—Tubes rolled into headers and reinforced with ferrules. 5—Fins are mechanically bonded to tubes. 6—Steel casing insulated from heating element . . . all welded construction. 7—Streamlined motor bracket. 8—Rubber insulated motor mounting. 9—Aerodynamic fan shroud. 10—Fan gives maximum air delivery and operates quietly. 11—Motor designed for Unit Heater operation. 12—Spring mounting permits expansion and contraction of heating element. 13—Sturdy, adjustable louvers. 14—Gray metallic finish. 15—Provision made for hanging unit independent of piping.

"Vertiflow" and Cabinet type models also available. Catalogs sent upon request.

YOUNG RADIATOR COMPANY General Offices: RACINE, WISCONSIN
Factories at RACINE, WIS., and MATTOON, ILL.

Begins on page 254

Good Ways to Solve Special PLANT ▶ OPERATING PROBLEMS

To get these catalogs, circle numbers on coupon, page 128 or 248.

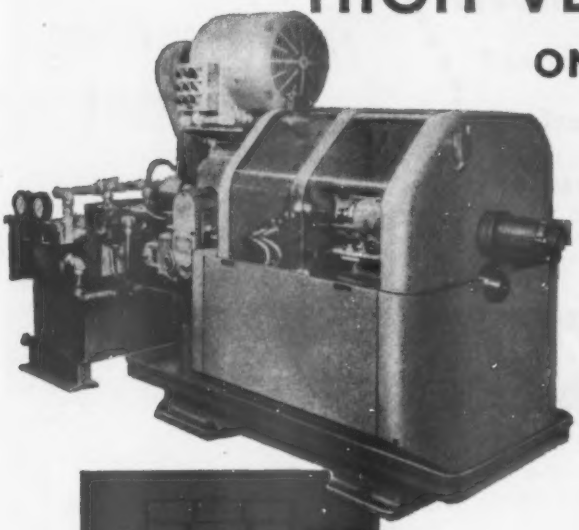
43 TO SPEED TAPING IN PRODUCTION AND PACKAGING, Derby Sealers, Inc., suggests you use its "Grip-A-Tab." This air-automatic pressure-sensitive tape dispenser has foot-lever operation to reduce dispensing time, and cuts to predetermined lengths to eliminate tape waste.

44 FOR AUTOMATIC PRODUCTION MARKING on parts made of plastics, metal, or other material, the Acromark Co. offers its Series 9AA marking machine. Said to handle 40 or more pieces a minute. The air-operated assembly combines feeding of parts, marking, and automatic ejection. Works on standard air lines, requires only 75 psi.

45 TO INCREASE DIAMOND LIFE IN DRESSING GRINDING WHEELS, you can automatically index the diamond. Industrial Diamond Co. and Corr Instrument Co. jointly announce their Industrial Diamond Turner, a compact, self-contained electro-mechanical device does just that. Can be operated by mechanical contact or manually. And you can slip it into the existing diamond holder.

46 TO ELIMINATE MESSY SPRAY BOOTH TANK CLEANING, Industrial Filtration Co. recommends its Delpark industrial filter. Automatic skimming and filtration removes paint regularly before it has had time to sink or circulate in the system. Self-cleaning gravity filters discharge the paint in a relatively dry state into an outside container.

AUTOMATICITY BACKS UP HIGH VELOCITY TURNING ON FAY AUTOMATICS



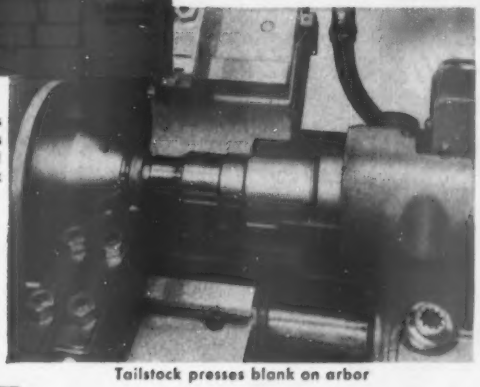
SIDE GEARS
18 Seconds Floor to Floor — 635 SFM

Two 8" Fays, with Automatic Sequential Control, machine all exterior surfaces of the blanks in two operations; one machine for each. The major diameter is 2-15/16" and floor to floor time is approximately 18 seconds in each operation.

Automatic Cycle—The machines are equipped with automatically operated splash guards and automatically air-operated tailstock rams for pressing the blank onto a splined arbor equipped with automatically operated ejector pins.

The operator places the blank on the end of the arbor, and pushes the cycle start button. *Automatically, the guard closes, the tailstock ram presses the piece onto the arbor and then retracts. The carriage turns, the back arm faces, and at the end of the cuts, ejector pins push the piece onto the loading section of the arbor* from which it is removed manually.

FIRST OPERATION: Note intricate movements of the carriage, which turns the hub, back angle and major diameter. The back arm faces and forms.



Tailstock presses blank on arbor

Ejector pins release blank from arbor

Production management regularly relies upon the engineering services of Jones & Lamson for the latest information on methods, costs, tooling and performance. Why not consult us about YOUR *turning, threading and inspection problems.*

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 505 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

FAY LATHE DIVISION

Stack high and reach far?

Handle large or small loads?

Do construction and maintenance?

Pick up and transport any material?

Push or pull cars or trailers?

Work in any weather...on any surface?

Can Your Yard Handling Equipment DO ALL these JOBS?

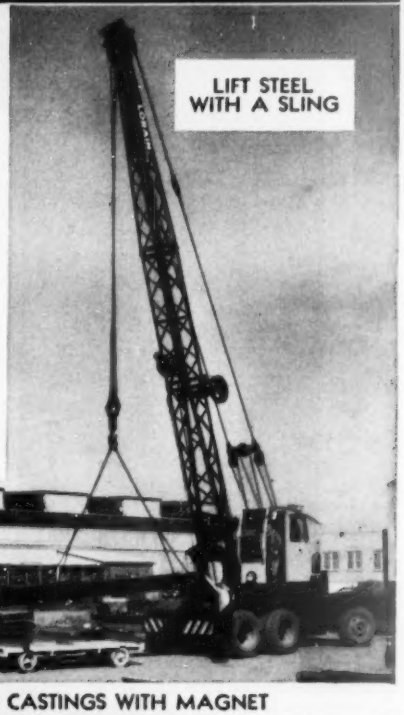
YOU CAN WITH A VERSATILE LORAIN SELF-PROPELLED CRANE

A Lorain Self-Propelled Crane is practically a yard crew in itself. Just look at the varied jobs it can perform. Where other yard material handling equipment is limited, Lorain Self-Propelled Cranes go all the way — with a saving in time and money on every use.

There are many reasons why more and more plants are putting Lorain crane power on rubber to work on their material handling jobs. Lorains offer a selection of capacities up to 45 tons. Interchangeable front ends, combined with more than 16 lifting and loading attachments make them one of the most versatile material handling tools money can buy. Rubber-tire mountings add the big advantage of speed and mobility. Their automotive-type air power steering and air brakes contribute to maneuverability and safety.

Thew-Lorain Distributors, located in 146 cities, can provide your plant with vital facts and figures about cost-cutting Lorain performance.

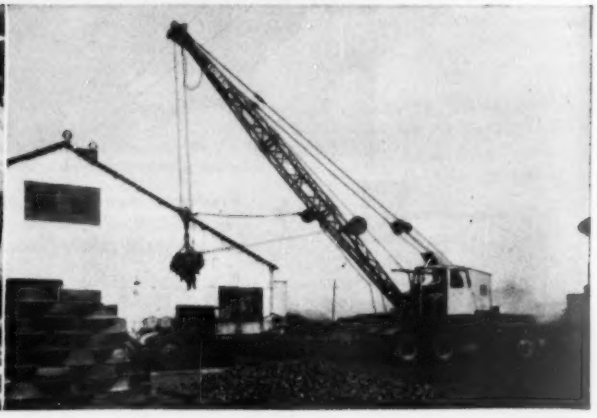
THE THEW SHOVEL CO., LORAIN, OHIO



THEW LORAIN Cranes FOR INDUSTRY

HANDLE LOOSE MATERIAL WITH CLAMSHELL

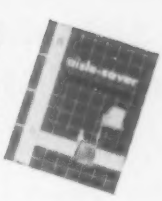
LOAD CASTINGS WITH MAGNET



for fast operation
in congested areas and
narrow aisles

aisle saver®
FORK TRUCKS

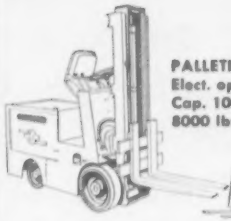
WRITE FOR BULLETIN 5210
This informative, illustrated bulletin describes the complete aisle saver line with load and clearance charts, lifting capacities and other data. Every plant manager should have a copy.



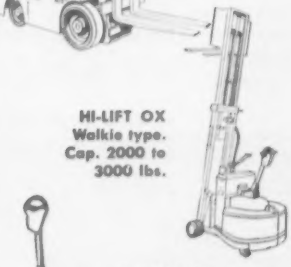
AISLE SAVER IS JOB ENGINEERED to operate efficiently in congested areas; short, compact construction permits right angle stacking in extremely narrow aisles . . . a space-saving feature.

ADDITIONAL ADVANTAGES: Stand-up end control permits operator to get on and off, quickly. 4 speeds forward plus reverse. Hydraulically operated lifting and tilting with all safety features. Electrically powered for silent fume-free operation without fire hazard.

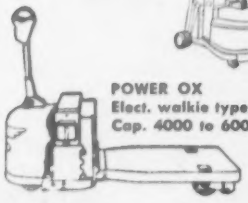
AISLE SAVERS ARE AVAILABLE in capacities of 1000, 2000, 4000 lbs. Model 1000 right angle stacks in 59" aisles plus load length.



PALLETIER
Elect. operated.
Cap. 1000 to
8000 lbs.



HI-LIFT OX
Walkie type.
Cap. 2000 to
3000 lbs.

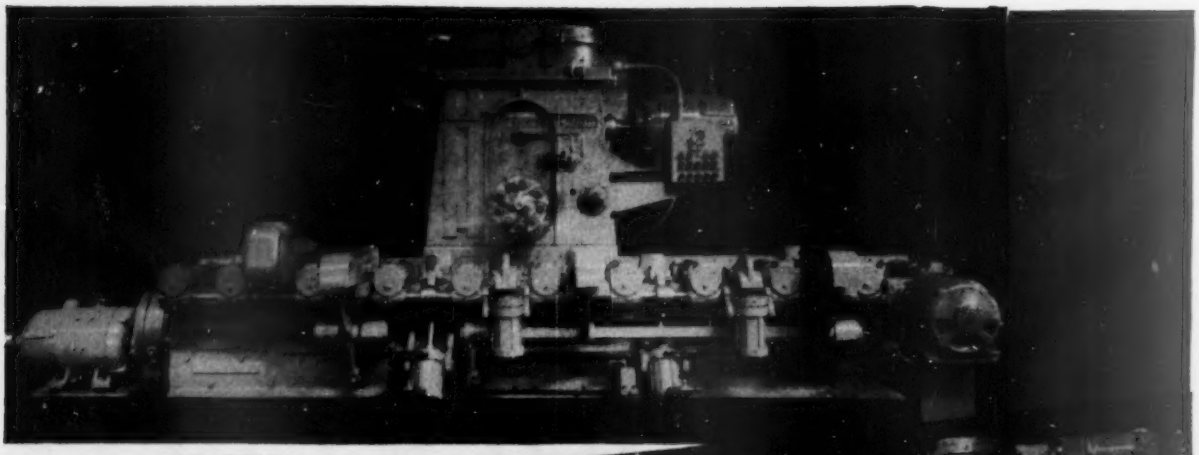


POWER OX
Elect. walkie type.
Cap. 4000 to 6000 lbs.

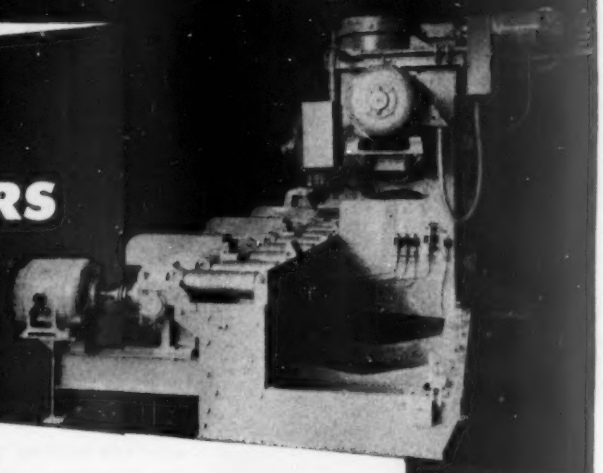
PALLET HANDLING
Elect. or hand pallet
handling trucks.

CRESCENT TRUCK COMPANY
Lebanon, Pennsylvania

CRESCENT



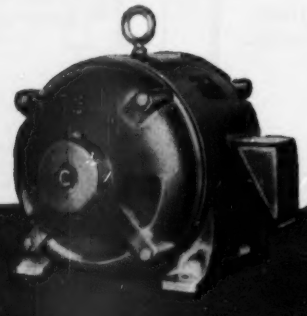
15 Century MOTORS PROVIDE THE "MUSCLE"



For Speedy Skinning of High-Chrome Steel Billets

The power to skin "52100" high-chrome steel billets at the rate of 2900 sq. in. per hour flows smoothly from a coordinated combination of 15 rugged Century motors on this massive machine.

Here is another example of how leading manufacturers depend on Century motors to bring out the best performance in metal-working equipment. You'll find it worthwhile to follow their example and specify Century motors on all your equipment. Your nearby Century district sales office or Century distributor will be glad to give you more information.



⅛ to 400 h.p.—A.C. or D.C.—Drip Proof, Splash Proof, Enclosed Fan Cooled and Explosion Proof Frames, for almost all atmospheric conditions—and unusually free from vibration.

-799

CENTURY ELECTRIC COMPANY

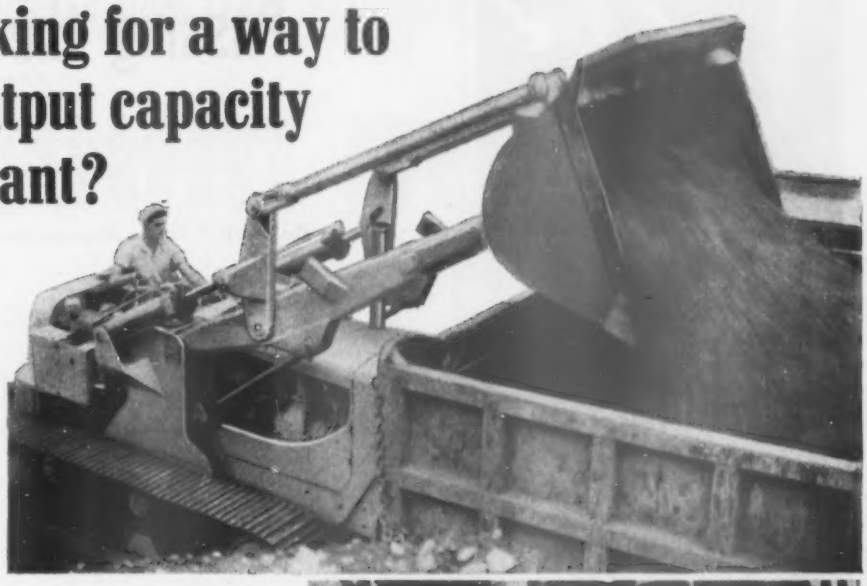
1806 Pine Street St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

Century C MOTORS

MR. PRODUCTION MANAGER:

are you looking for a way to feed more output capacity *into* your plant?



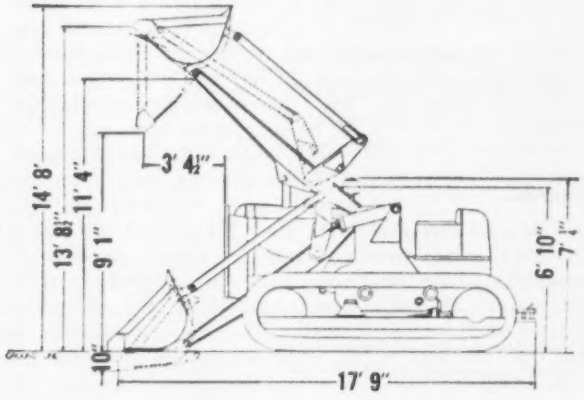
This Allis-Chalmers HD-9G Tractor Shovel might well be the answer. It offers the same outstanding versatility and performing ability as the 1-yd. HD-5G—the recognized standard of comparison—*plus* bigger capacity, higher reach and more power. With the HD-9G, one man can move more material per shift . . . handle a wider variety of jobs inside and out.

LOADS FAST WITH BIG TWO-YARD BUCKET

The HD-9G digs, stockpiles, loads trucks, feeds hoppers — handles any bulk material two big yards at a scoop. Special 3½-yd. light materials bucket almost doubles output in materials weighing not more than 1400 lb. per cu. yd. Exclusive Allis-Chalmers shift pattern further speeds loading by allowing operator to go from low forward to fast reverse with one simple gear shift.

HIGH DUMPING HEIGHT — 11 FT. 4 IN. UNDER BUCKET HINGE

Here is a Tractor Shovel that reaches for extra jobs. With bucket fully raised, it dumps into high bins. Also, tractor can work right up on storage piles, making it possible to put many more yards of material in a given area.



OVERALL WIDTH, 7' 11¼"

Ask your Allis-Chalmers dealer to show you the many ways this HD-9G has helped others step up production.

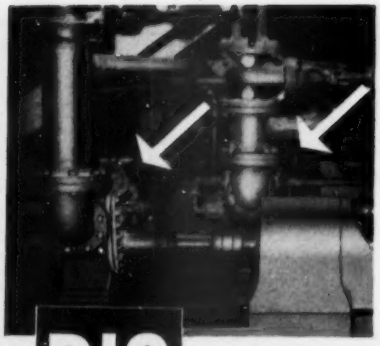
WORKS IN CLOSE QUARTERS — NO BULKY SUPERSTRUCTURE

Compact design, plus the ability to turn in its own track length, enables the HD-9G to work in confined areas or where there is little more than tractor-height headroom.

POWERFUL — 72 DRAWBAR HP

The HD-9G has the power, weight and traction to handle tough excavating on new construction, maintain yard roads and parking lots, spot railroad cars, lift, carry, push or pull heavy loads of all kinds.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.



BIG SUGAR MILL

...uses KINNEY pumps

Kinney Model SD Rotating Plunger Pumps handle 1st and 2nd molasses at giant Dominican sugar mill CENTRAL RIO HAINA — perhaps the largest mill in the Americas. Here's what they gain by using Kinney SD Pumps:

1. **Positive displacement pumping of meter-like dependability.**
2. **Low-maintenance operation insured by conservative rating of shafts, bearings, and other moving parts.**
3. **Efficient handling of viscous materials due to unique rotating plunger design.**
4. **The right pump for the job — insured by Kinney's wide range of models and sizes.**

Kinney Manufacturing Co.—manufacturers of liquid and vacuum pumps. Representatives throughout the United States and in foreign countries.

GET ---FULL--- DETAILS

SUBSIDIARY OF THE NEW YORK AIR BRAKE CO.
Kinney

KINNEY MANUFACTURING CO.
3624 Washington St. • Boston 30, Mass.
Please send Bulletin L-51 describing the complete line of Kinney Liquid Pumps.

NAME .....
COMPANY .....
STREET .....
CITY ..... STATE .....

Passing the Buck Up

By LAWRENCE A. APPLEY
President, American Management Association

Reprinted from Management News, April 1953

In one of the popular national magazines there appeared recently a cartoon that showed an exasperated business executive blasting two quaking subordinates: "I don't want you to come to me with problems! Bring me solutions!" The point of the cartoon seemed to be that it could be considered humorous for the tycoon to demand that his underlings supply solutions—the implication being, what did he think *he* was paid to do?

It is doubtful whether the cartoonist appreciated the real significance of the situation he so comically depicted. If he meant it to be funny, (and there appeared to be no other intent) then he certainly showed little first-hand experience with executive responsibility or the principles it involves.

The fact is that the tycoon was making a perfectly legitimate demand. His job is to see that solutions are found to problems, but not to provide solutions to all problems. He must consciously and constantly fight the tendency of others to "pass the buck" up the line of command.

"Nothing Ventured—"

It is a perfectly natural and human tendency to let the boss (at any organizational level) take the responsibility for finding the answers. This stems first from the false assumption that the boss is always right and second from the realization that if the answer is wrong, someone else takes the rap. Not uncommonly many who cry out for responsibility and authority will not take it when it is delegated to them.

How many times have you become irritated in a discussion with a subordinate because it does not seem to be getting anywhere and there appears to be no way to bring it to a conclusion? The next time this occurs, see if something like this has happened: The subordinate has presented a problem, set forth all the facts in meticulous detail, and made it seem serious enough to justify his having brought it to you. Then he stops and looks at you with a question mark all over his face, or perhaps he comes right out and asks you what he should do.

Positions Reversed

The natural tendency is for you to suggest some possible course of action and for the subordinate to point out why this one or that one is not so good. Finally, under pressure of time or other matters that are demanding your attention, you say, "Well, let me sleep on it," or "Let me think about it and I'll call you." Now *you* have the problem and he can relax until he hears from you.

Do you see what has happened? The subordinate, probably unintentionally, reversed positions with you. He pitched the ball to you and then sat in judgment on how well you handled it. If he does that often enough, or if enough of your subordinates do it, you have all the problems and the organization is waiting for your solutions. You also have yourself in training for ulcers.

Decisions have to be made and made at the proper time if an organization is to be dynamic and

cut pump-down time in half!
increase operating efficiency!
of....

Vacuum pumps

with the new Houdaille

WATER-OIL SEPARATOR

● **Removes moisture from vacuum pump oils; cuts pump-down time in half...** Keeps oil clean and dry. Enables pump to provide a high vacuum *without oil change* and eliminates pump "drying out" maintenance!

● **Eliminates changing or discarding of oil; allows maximum pump operating efficiency...** Increases production due to less downtime. Actually provides *2-way protection*—filtering out contaminants from oil as it separates water!

DRI-PURE is easy to install—can be hooked up to service one or more vacuum pumps depending on the application. *Quickly pays for itself in oil savings alone!*

WRITE TODAY for complete information. Equipment Bulletin available on request.

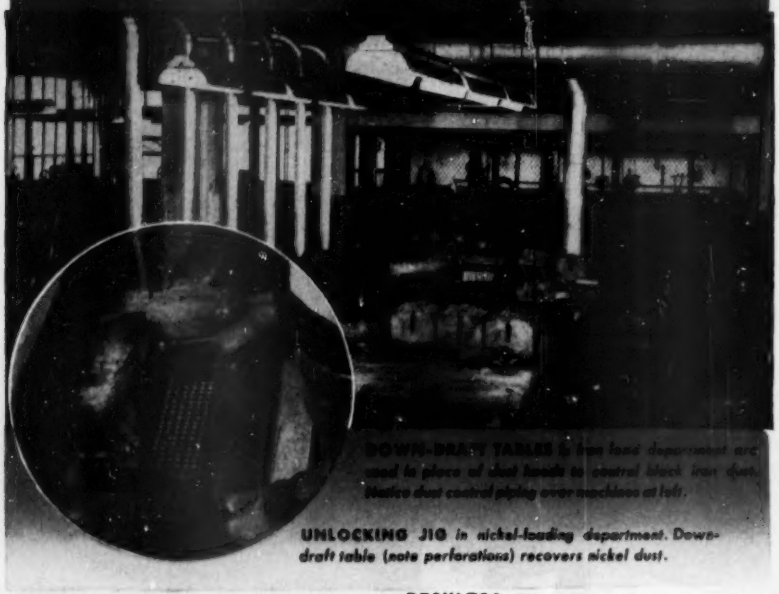
Honan-Crane Corp.
325 Superior Ave., Lebanon, Indiana
a subsidiary of....
Houdaille-Hershey Corp.

In Canada: E. W. Playford, Ltd., Montreal 28
W. E. Micklethwaite, Toronto 18

WORLD'S LEADING OIL FILTER MANUFACTURER

Pangborn Dust Control *pays for itself* in recovered material

at Thomas A. Edison, Incorporated



UNLOCKING JIG *in nickel-loading department. Down-draft table (note perforations) recovers nickel dust.*

MANUFACTURING nickel-iron-alkaline storage batteries at Thomas A. Edison, Incorporated, creates nickel, nickel-hydrate, and iron-oxide dusts. Control and recovery of these valuable dusts was complicated by their light weight, which in some processes prevented the use of regular dust-collecting hoods. Pangborn engineers solved this problem by utilizing down-draft tables in a unique dust control system geared to Edison's particular requirements.

RESULTS? The Pangborn system pays for itself in recovered dust alone. In addition, the dust-free atmosphere has improved working conditions in the plant. Although this Pangborn dust control system is a major installation, it was completed without loss of a single day's production!

WHAT ARE YOUR DUST PROBLEMS? Find out how Pangborn can help you. Mail the coupon below today for Bulletin 909-A.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

Pangborn **DUST CONTROL**

STOPS THE DUST HOG from stealing profits

PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me a copy of Bulletin 909-A.

Name.....

Firm.....

Address.....

City..... Zone..... State.....

PASSING THE BUCK UP

Begins on page 262

progressive. Decisions must be made, however, at a level as near as possible to the point where they have to be put into effect. If, for good reasons, a decision must be checked at a higher level, the higher level should sit in judgment on the recommendation — but should not initiate it. If the recommendation is not acceptable, let the *subordinate* "sleep on it" and come back with a better one.

It is a wise executive who is able to train his subordinates to think for themselves and find solutions to their own problems. And fortunate is the man who has such a superior, for that quality of management means progress for the organization and personal growth and satisfaction for the individuals concerned.

Passing the Buck Back

An easy way to pass the buck back, when someone working for you requests a solution to his problem, is to ask, "What do you think?" Another way is to have a fixed policy that no one is to present a problem to you without a recommended solution.

It is quite possible that an individual who refuses to come up with a recommendation, or who cannot, lacks the maturity required for acceptance of responsibility. He probably lacks confidence in himself and his own judgment and is unwilling to "stick his neck out." If so, this should be noted and every attempt made to correct the situation. If it cannot be corrected, we should recognize that we have a liability on the team. Maturity is an essential ingredient in management competency.

There is nothing funny, therefore, about asking subordinates for solutions and not problems. The executive who encourages his men to bring him answers instead of questions is simply curtailing a natural inclination on their part to "pass the buck." He is an able man.

We Beat ALL "Life Expectancy Tables"*

WITH TWO EXTRA-DUTY CATHODES AT EACH END, I GIVE YOU TWICE THE AVERAGE LAMP-LIFE!
I LAST AND LAST BECAUSE OF MY STRONGER, LONG-LIFE FILAMENT!
DURO-TEST
CANDELITE 40W CSE
1000 USER HOURS
R788
LIFE EXPECTANCY TABLE
LIFE EXPECTANCY TABLE
DURO TEST

"Built Stronger To Burn Longer"

Tough commercial and industrial operating conditions call for "tough", ruggedly built lamps that can take long hours of continuous service without failure. Duro-Test lamps require fewer replacements, fewer maintenance man-hours ... Costs are sharply reduced.

All our representatives are factory trained by Duro-Test engineers to give complete, personalized lighting service. *Write for details today!*

**LIFE-RATINGS IN OUR BUSINESS*

DURO-TEST CORPORATION

North Bergen, New Jersey

FASTER FINISHING

at less cost!

CP Hicycle Portable Electric Tools for grinding, sanding, buffing and polishing finish products faster, increase man hour productivity — and at far less cost!

Lightweight and easy-to-handle CP Hicycle tools operate under constant speed — there's no sag under full load. Their Hicycle induction motor and rugged design assure maximum low-cost power and long service life with minimum maintenance . . . has a solid rotor, no armature to burn out . . . no commutator or brushes to replace. If you use or can use six or more portable tools in one location, we would like to demonstrate the advantages of CP Hicycle tools in operation at your plant. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N.Y.*

Chicago Pneumatic

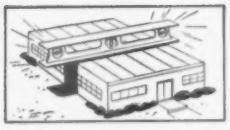
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Smooth-surfaced asbestos roof

FOR DEAD-LEVEL DECKS!

The Johns-Manville Flexstone Special Built-up Roof

NO SLAG - NO GRAVEL



The J-M Asbestos FLEX-STONE* SPECIAL Roof has been developed for decks from dead level to ½″ incline per foot. This new Flexstone specification uses coal tar roofing pitch as the cementing agent. It is the result of extensive experimentation in the Johns-Manville Research Center and years of successful tests in the field. Now for the first time you can have the advantages listed below on a flat or nearly flat roof deck construction.

1. **No gravel or slag**—cuts down excess weight and saves labor costs!
2. **Smooth-surfaced** to afford good drainage and make maintenance and alterations easier!
3. **Asbestos**—J-M Flexstone Felts are made of fire, rot and weatherproof asbestos. They last longer and give more enduring protection.
4. **Won't dry out**—Because they are made of mineral asbestos, Flexstone Felts are unique in their resistance to the destructive effect of sun!

For added protection, the J-M Asbestile* System of Flashing insures proper treatment of all critical areas. Asbestile is a heavy-bodied plastic cement for use with asbestos flashing felts to give thorough water-tightness. As it sets, Asbestile forms an integral part of the wall itself.

Flexstone Roofs are applied only by J-M Approved Roofers. For data on Flexstone Roofs and Asbestile Flashing Systems, send for folder BU-68A. Write Johns-Manville, Box 158, Dept. FM, New York 16. In Canada, 199 Bay St., Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville FLEXSTONE* Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

NEW SBS WATERLESS WASHSTATION*

"brings the washroom to the worker"*

for only $52.50 per unit

(F.O.B. Saginaw, Mich. Towel Dispensers not included)

SBS Waterless Washstations are complete units for hand washing on the job. Because they dispense SBS-30 Waterless Skin Cleanser, these Washstations require no plumbing . . . SBS-30 is simply rubbed on the hands and wiped off along with all the soil.

SBS Waterless Washstations—

- **In Trouble Spots** — Avoid workers use of irritating, harmful solvents. Quickly and safely removes tars, greases, paints, varnishes and other hard-to-remove soils.
- **On the Production Line**—Cuts to a minimum costly interruptions for hand washing.
- **Actually Earn You Money**—By eliminating one unnecessary trip per day for hand washing by only 10 men, you can save up to $720 annually.

Fill out and mail the coupon below for complete information about SBS Waterless Washstations and our 30-day no-risk money back trial offer.

*Trademark

SUGAR BEET PRODUCTS CO., Dept. 7H, SAGINAW, MICHIGAN

Sirs: Please send me full information about the new SBS Waterless Washstation and your 30 day no-risk money back trial offer.

NAME_____

TITLE_____

COMPANY_____

CITY_____ ZONE____ STATE_____

SUGAR BEET PRODUCTS CO. • Saginaw, Mich.

Chemical By-Products Division

NEW-MATERIALS

LIGHTWEIGHT CONCRETE BUILDING BLOCKS made of specially treated blast furnace slag. Has an average weight of 30 pounds, compared to about 40 for gravel blocks. They act as sound absorbers inside factories and have a high fire-resistance rating. American Iron and Steel Institute, 350 Fifth Ave., New York.

HIGH-TEMPERATURE CERAMIC, Alsimag 539, is used to make work-holding fixtures for brazing, welding, electronic heating, and flame-polishing operations. Material is fine-grained silicon carbide, useful where rapid thermal changes occur. Because of difficulty in machining, there are limitations on making complicated shapes. American Lava Corp., Chattanooga 5, Tenn.

ULTRA-HIGH FREQUENCY INSULATING MATERIAL with good heat resistance and machinability is available from The Polymer Corp. of Pennsylvania, Reading, Pa. Called Polypenco Q-200.5, this industrial plastic is used for electrical, electronic, and other allied equipment. It is clear, rigid, and transparent.

PLASTIC COATING FOR FLEXIBLE STEEL TUBING and other hard-to-coat products has been developed by Pyramid Plastics, Inc., 544 Polk St., Chicago 7. The covering will not reduce the flexibility of the product itself.

A SAFE REPLACEMENT FOR CARBON TETRACHLORIDE has been announced by the Penetone Co., Tenafly, N. J. This solvent, known as Penolene 643, retains carbon tetrachloride's desirable qualities such as non-flammability, quick drying, and powerful solvent action, but reduces toxic hazard to an all-time low, the maker says.

TECTUM is a roof-deck material combining light weight and non-combustibility with insulation and acoustical properties. Manufactured by the Tectum Corp., Newark, Ohio. It comes in many sizes and thicknesses. Tectum is made from a wood fiber base, bonded with an organic thermal-setting cement under heat and pressure.

PUTTY-LIKE SILICONE-RUBBER COATING FOR ELECTRICAL INSULATION may eliminate the need for expensive metal can to protect coils and other small electrical components. Made by General Electric Co., Pittsfield, Mass. Will find wide application as Class H insulation in electrical equipment used under hot or moist conditions.

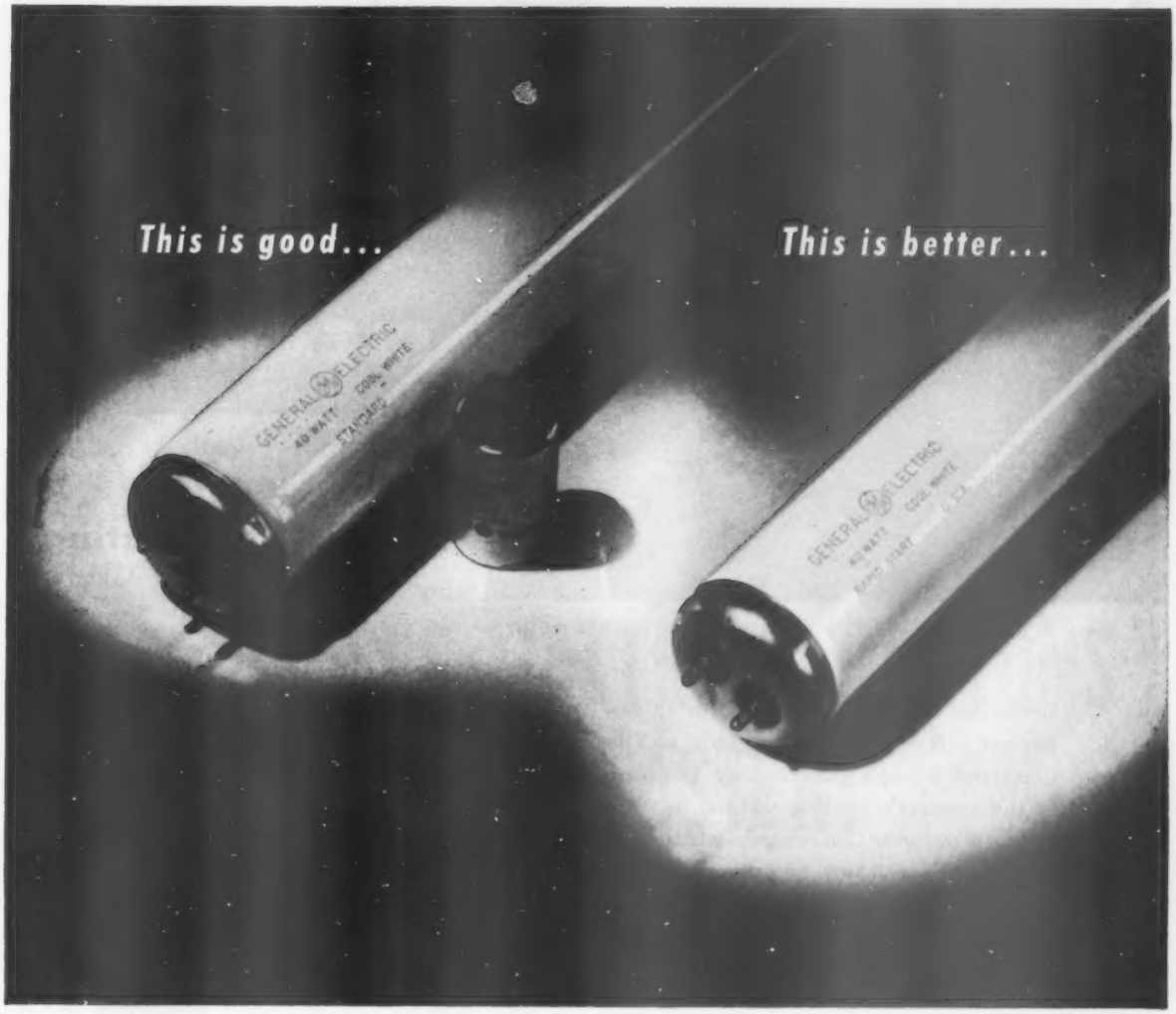
QUICK PIK, a dry, acidic salt mixture, removes rust and scale when mixed with water. Mitchell-Bradford Chemical Co., Stratford, Conn.

CERAMIC PERMANENT-MAGNET MATERIAL with magnetic and physical properties suited to many fields is being produced by Henry L. Crowley & Co., Inc., West Orange, N. J. Cromag is a powdered material that can be fabricated by powder-metallurgy methods into a wide variety of intricate shapes.

CHEMICALLY RESISTANT, FIBRE-BONDED FILTER FABRIC for use in filter presses and vacuum filters has been announced by the American Felt Co., Glenville, Conn. Has a multiple-carded construction for uniform fiber distribution. Typical uses are for dyestuff manufacture, cleaning electroplating solutions, production of yeast and food products.

ALKALI COMPOUND FOR CLEANING ALUMINUM that will not etch or discolor yet will do the most difficult type of heavy cleaning by spray washing has been developed by the Van Straaten Chemical Co., Chicago. With this cleaner there is no danger of fire, maker says.

New G-E Rapid Start lamp needs no starter, cuts maintenance



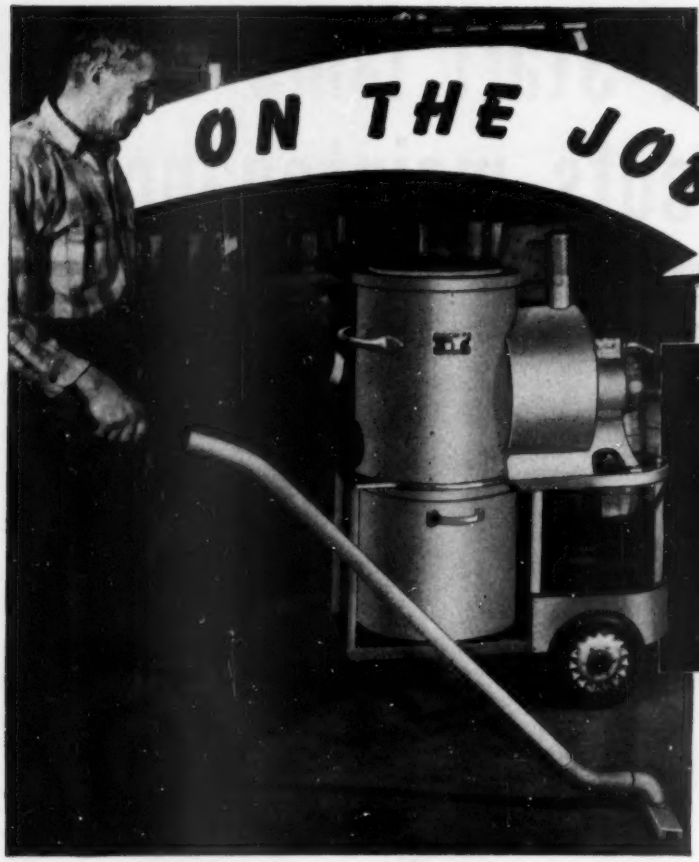
IN THE NEW RAPID START lamp circuit G-E has been able to eliminate the starter required in standard lamps to pre-heat the cathode. For that reason, maintenance is even easier, more economical than before.

This new General Electric *Rapid Start* lamp was made possible by two G-E developments: an improved triple-coil cathode that replaces the double coil in standard fluorescent lamps, and a *Rapid Start* ballast. Together, they give General Electric *Rapid Start* lamps almost instant starting and smooth, simple operation.

G-E *Rapid Start* fluorescent lamps are rapidly becoming available. Many leading fluorescent lighting fixture manufacturers are incorporating the new lamps and ballasts in their latest equipment. These two newest developments of G-E research are another reason why you can *expect* the best value from General Electric fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC



with

INVINCIBLE VACUUM CLEANERS

at Cleveland Electric Illuminating

Invincible Vacuum Cleaners form an important part of the "cleaning fleet" at The Cleveland Electric Illuminating Co., one of the country's leading utilities. At the C.E.I. warehouse illustrated, which has 30,000 sq. ft. of storage space for 4500 items, an Invincible Model 450 is used daily to keep floors and bins free of dust and dirt. Additional Invincibles are used by C.E.I. in other warehouses and plants.

Designed to give long, trouble-free service, Invincible Cleaners get all the dust and dirt, provide healthful and efficient working conditions. There are Invincible models to meet every industrial need.

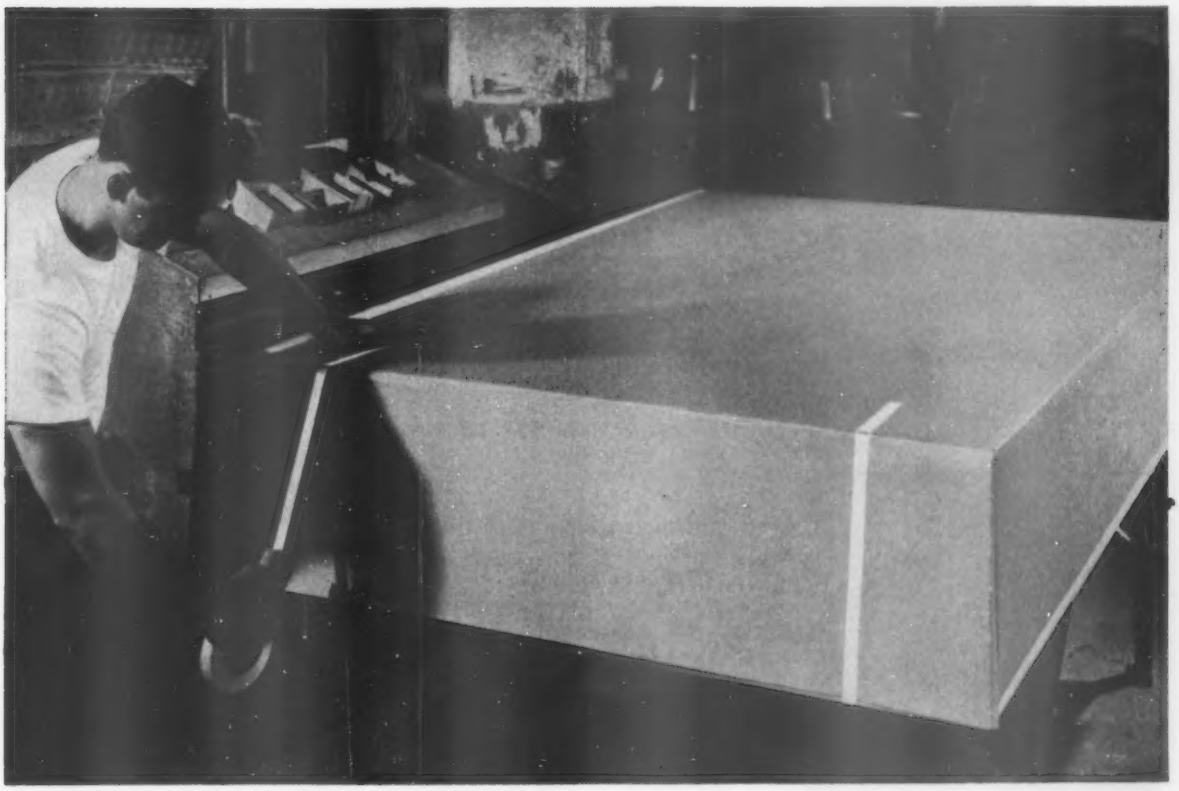
If *you* have a cleaning problem, let Invincible solve it.

SEND FOR BOOKLET — It tells —

- . . . About the 100,000 Invincibles now in service
- . . . About our 40 years' experience in this field
- . . . How Invincibles clean every spot in the plant
- . . . About the many materials reclaimed or removed

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT



King Koil finds...

TAPE CLOSES MATTRESS CARTONS 3 TIMES FASTER!

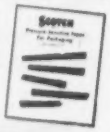
Super-strong "Scotch" Brand Filament Tape saves 27¢ a unit compared to old-fashioned banding that cut into cartons, damaged goods.

Only four short strips of "Scotch" Brand Filament Tape are needed to close huge mattress cartons for shipping at U.S. Bedding Co., St. Paul, Minnesota, makers of the King Koil mattress. No wonder they switched from sharp bands that had to completely encircle the corrugated containers! No wonder they turned to tape!

They found "Scotch" Brand Filament Tape not only faster and easier to apply, but more dependable, too. The resilient, pressure-sensitive tape sticks tight to the job—and absorbs repeated impact shocks that would snap ordinary materials in a second!

Add up the facts: faster production, lower costs, fewer damage claims. Why don't you switch to "Scotch" Brand Filament Tape?

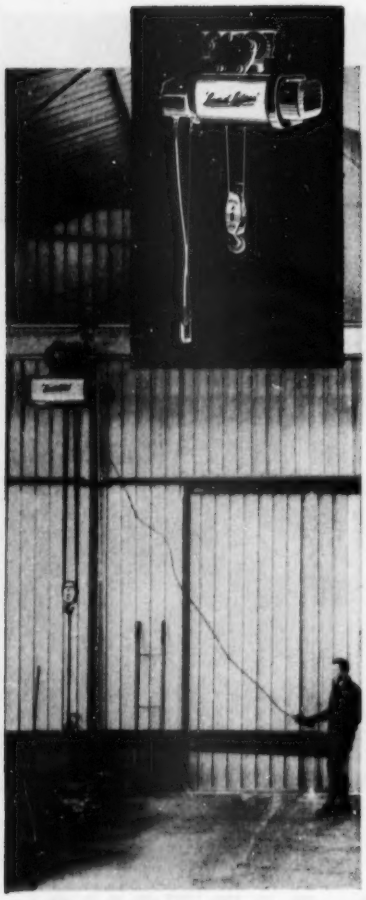
Your distributor can supply you in any of 3 colors and transparent, many widths and lengths. Order a supply today or write Minnesota Mining & Mfg. Co., Dept. FM-83, St. Paul, Minn., on your letterhead for a copy of " 'Scotch' Pressure-Sensitive Tapes For Packaging."



3M

The term "Scotch" and the plaid design are registered trademarks for the more than 300 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

REG. U.S. PAT. OFF.
SCOTCH
BRAND
FILAMENT
TAPES



SHORT CUT TO MORE PRODUCTION

The "Series 700" 'Load Lifter' is the electric hoist for the job. It's fast — lifts a ton 30 feet a minute. It's easy to use. Push-button control eliminates muscle strain; the operator stays fit.

The 'Load Lifter' is tough, safe — has steel suspension; safety-type lower block and hook; motor and load brakes that require no attention; heat-treated helical gears; only 24 volts at the push button. Give *your* production a lift — at lower cost. Capacities: ½ ton and up. Write for 'Load Lifter' Bulletin 399.

'Load Lifter' ®
ELECTRIC HOISTS
MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

BOOKS

For copies of books and booklets, write directly to publisher listed.

For All Engineers and Plant Executives

INTRODUCTION TO ENGINEERING ECONOMY

By **Baldwin M. Woods** and **E. Paul DeGarmo.** The Macmillan Co., 60 Fifth Ave., New York 11. 519 pp. $6.

If the engineer is to give and get the proper consideration from the business world and assume more responsibility in the management of industry and government, he must speak and understand the language of the businessman.

The authors of this book feel engineers need not be experts in subjects such as economics, accounting, and statistical methods. They should, however, be able to employ these tools in a way that indicates a respect for their value and importance. Such knowledege will do much to avoid misunderstandings and increase the business world's appreciation of engineers.

Engineering economy deals with the cost factors and the financial efficiency of the utilization of capital required for a project. It involves the application of certain laws of economics, theories of investment, and practices of business to problems otherwise purely technical.

The authors also cover briefly the effect of the human individual on the economy of an engineering undertaking.

Although this book is primarily a text for senior engineering students, the authors are aware of its usefulness to practicing engineers who in the daily practice of their professions, realize the deficiencies of their college curricula in respect to engineering economy.

WELDESIGN

Contains a wealth of material on the designing of machinery from welded steel. Book is accompanied by supplementary material to facilitate setting up a self-study program for design engineers. This is the first public offering of this data which has been used previously by Lincoln to train designers and engineers in the WelDesign system of machine design. The Lincoln Electric Co., Cleveland, Ohio. 228 pp. $10.

INDUSTRIAL WASTES: THEIR DISPOSAL AND TREATMENT

Here's a book that should interest many plant engineers. It's written by a group of experts with long experience in the treatment of industrial waste materials. Discusses the problem in general and as it applies to individual industries. An up-to-the-minute chapter covers treatment and disposal of liquid radioactive wastes. Edited by Willem Rudolfs. Reinhold Publishing Corp., 330 W. 42nd St., New York 36. 497 pp. $9.50.

MECHANICAL POWER TRANSMISSION MANUAL

This book is for men who are responsible for the design, manufacturing, selection, application, and maintenance of mechanical power transmission equipment. Has plenty of information on all phases of this field. By W. A. Williams. Conover-Mast Publications, Inc., Chicago. 423 pp. $6.

THE LOCAL UNION

Should interest your industrial relations people. Gives an inside picture of the problems of the union leader in determining policy. By Leonard R. Sayles

HOW MUCH ARE YOUR FLOORS COSTING YOU, MR. MAINTENANCE MAN?

When you add the cost per square foot for repairing your present factory floors to the cost of cleaning them, does the total seem too high?

Probably—because most factory floors of wood or concrete are costly to repair—and are expensive and difficult to clean and keep clean.

Vina-Lux is a tough, greaseproof vinyl asbestos floor tile designed to out-perform wood and concrete factory floor surfaces. It can be installed quickly and easily over any smooth wood or concrete floor and it can be used as soon as it is installed. Vina-Lux can mean real savings per square foot in *your* plant.

Why? Because Vina-Lux is made largely of vinyl resin and asbestos fibre. These two extremely durable materials plus pigment and filler are combined under high heat and pressure to produce a smooth-surfaced flexible tile—easy to install, easy to clean, and resistant to those abuses common in manufacturing plants.

Vina-Lux is not softened or affected by most greases, oils and alkalis. Its tough, resilient structure is tightly interlaced so that rolling friction from material handling trucks does not beat it apart. Dropped tools, heavy usage do not splinter or abrade away this modern answer to factory floor traffic.

Twenty attractive colors, many of them with exceptional light reflectance, mean beauty as well as durability when you use Vina-Lux. Why not investigate this new approach to factory floors? Ask us to have a qualified representative call and discuss your flooring problems with you. There is no obligation, of course.

UVALDE ROCK ASPHALT CO.

FROST BANK BUILDING • SAN ANTONIO, TEXAS

Makers of AZROCK • AZPHLEX • VINA-LUX • DURACO

AZROCK FLOORING PRODUCTS

"Azrock Makes Fine Floors"

Now—
fast insulation protection

Laykold®
ASPHALT SPECIALTIES

WEATHERCOAT sprays on!

—in one-third the time required for troweling

● **FIRST COAT** bonds and protects wire netting.

● **SPRAY GUN** applies second coat, too, in fastest possible time.

● **TRIPLE-SEALED** and smooth, after wet brooming.

WEATHERCOAT—the standard of quality in the industry—for lasting protection.

AMERICAN Bitumuls & Asphalt COMPANY

200 BUSH ST. • SAN FRANCISCO 4, CALIFORNIA

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 272

and George Strauss. Harper & Bros., 49 E. 33rd St., New York. 269 pp. $3.50.

A POLICY FOR SCIENTIFIC AND PROFESSIONAL MANPOWER

This study by the National Manpower Council evaluates the specialists manpower situation, suggests additional research be undertaken, and makes specific recommendations for action. Columbia University Press, 2940 Broadway, New York. 263 pp. $4.50.

THE WRITINGS OF THE GILBRETHS

A collection of the writings of two pioneers in the field of industrial management, Frank and Lillian Gilbreth. The editors have attempted to include examples of principles and problems which seem of a lasting nature. The book reveals clearly the Gilbreths' basic concepts of industrial engineering and industrial relations. Edited by William R. Spriegel and Clark E. Myers. Richard D. Irwin, Inc., 1818 Ridge Rd., Homewood, Ill. 513 pp. $7.35.

FIRE PREVENTION AND PROTECTION FUNDAMENTALS

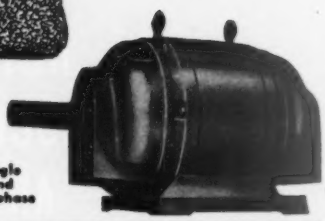
Comburology (study of combustion) is explained by the author in terms helpful to the engineer. The 35 causes of industrial fires are treated in one section of the book. By Gilbert E. Stecher. The Spectator, Philadelphia 39. 744 pp. $10.

FUNDAMENTAL RESEARCH IN ADMINISTRATION

Seventeen of the nation's top executives, educators, and researchers discuss the administrative problems to be solved by research. Carnegie Press, Carnegie Institute of Technology, Pittsburgh. 89 pp. $2.

Turn the page

CUSTOM-BUILT— NOT CUSTOM PRICED



Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

Write for Complete Details Today

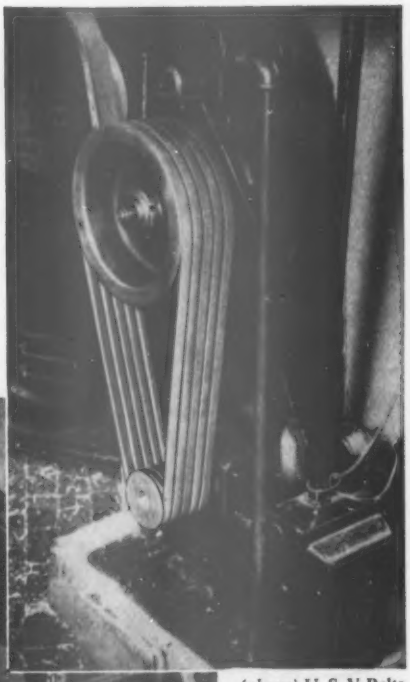
VALLEY ELECTRIC CORPORATION
4221 FOREST PARK BLVD. • ST. LOUIS 8, MO.

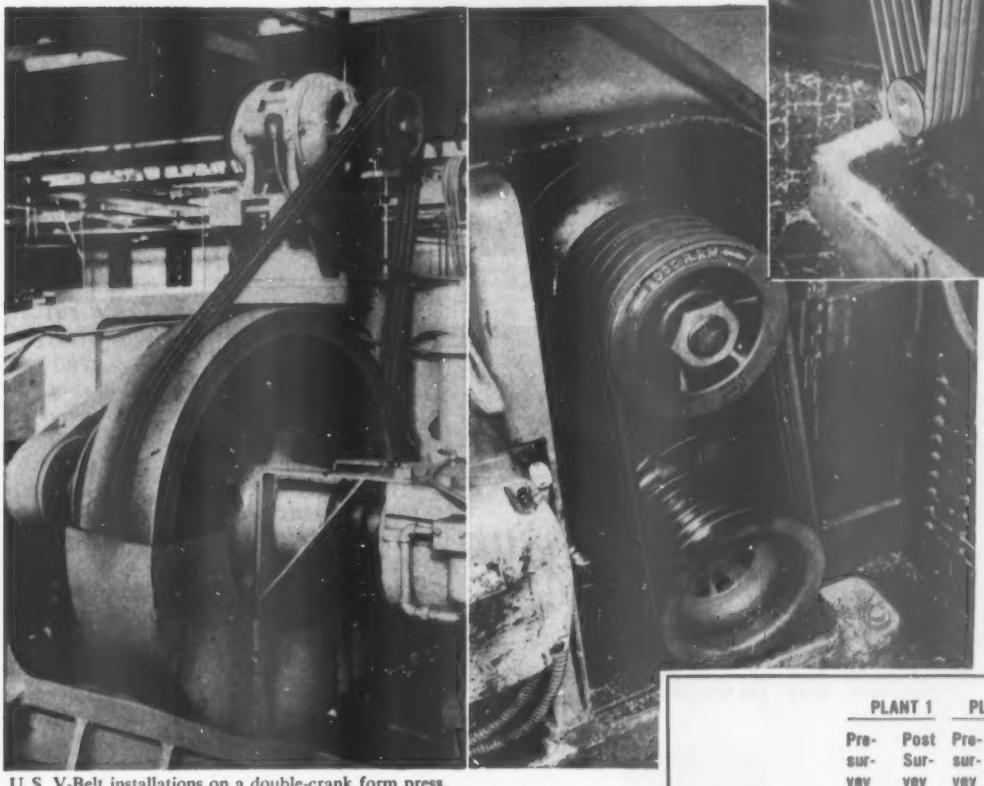
The new **HERMAN NELSON** *GAS FIRED Unit Heaters are made in seven sizes with heat output ranging from 20,000 to 160,000 B.T.U.'s per hour.*

For some "HOT NEWS" on these new heaters write to . . . . .

American Air Filter
COMPANY, INC.
215 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

"U. S." V-Belt engineer eliminates 51 sizes from customer's stockroom!





U. S. V-Belt installations on a double-crank form press.

(above) U. S. V-Belts on a horizontal milling machine.

(left) U. S. V-Belts on a vertical milling machine.

(below) Chart shows reduction of V-belts in customer's 2 plants after survey by "U. S." engineer.

	PLANT 1		PLANT 2		TOTAL	
	Pre-survey	Post Survey	Pre-survey	Post Survey	Pre-survey	Post Survey
No. V-Belt Drives	1084	1084	308	308	1392	1392
No. V-Belts	3103	3103	757	757	3860	3860
No. V-Belt Sizes	152	109	85	70	169*	118*
No. Sizes Eliminated		43		15		51*
Percent Decrease In No. Sizes Used		28.2%		17.6%		30.2%

*Duplicate sizes in each plant not counted in this total.

Here's what the Plant Maintenance Manager said: *"Stocks have been simplified . . . and the ordering of replacement parts has been made much easier."* With U.S. Rainbow® V-Belts, 51 sizes were eliminated—a saving of 30.2%. This was the result of a survey made by a U. S. Rubber engineer in two plants of a leading aircraft manufacturer. So impressed was the customer by the thoroughness of this "U. S." engineering service that he has invited "U. S." to make a Packings Survey.

"U.S." has the largest collection of V-Belt molds in the world and can fill any requirement. "U.S." engineers do not believe their job stops when the sale is made. You will find them constantly helpful in belt service and selection. Call them at any of our 25 District Sales Offices or write to address below.

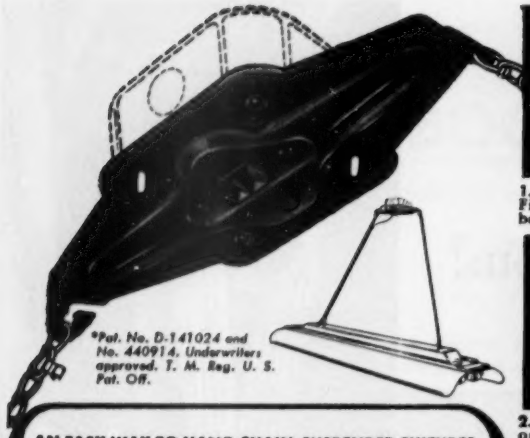
"U.S." Research perfects it
"U.S." Production builds it
U.S. Industry depends on it.

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting



*Pat. No. D-141024 and No. 440914, Underwriters approved. T. M. Reg. U. S. Pat. Off.

AN EASY WAY TO HANG CHAIN-SUSPENDED FIXTURES IN LESS TIME...AT LESS COST...WITH LESS WORK WITH

HYDEE HANGER*

DECIDEDLY BETTER DAY-BRITE Lighting Fixtures

01

1. Connect wires to receptacle. Fits standard 4" or 3¼" outlet box or plaster ring.

2. Screw hanger to outlet box—only two screws needed. No centering, punching, or drilling. Screwdriver only tool needed.

3. Hang the fixture and plug it in. That's all! Self-grounding—regular 2-wire cord and plug may be used.

Hydee Hanger: complete with receptacle, two 5-ft. chains, "S" hooks and clips—

Day-Brite Lighting, Inc., 5441 Bulwer Ave., St. Louis 7, Mo.
In Canada: Amalgamated Elec. Corp., Ltd., Toronto 6, Ontario

DISTRIBUTED NATIONALLY BY LEADING ELECTRICAL WHOLESALERS

When temperatures go up—

don't let production go down

There's one way to keep hot-weather production at the peak . . insure an abundant supply of cool, refreshing water for your workers in plant or office. You can do just that with Halsey Taylor Electric Coolers and fountains. Trouble-proof, economical, health-safe. Write.

THE HALSEY W. TAYLOR CO., WARREN, OHIO

Halsey Taylor

DRINKING FOUNTAINS

F-27

For copies of books and booklets reviewed, write directly to publisher listed

BOOKLETS

Begins on page 272

INDUSTRY ENTERS THE ATOMIC AGE. Discussion of practical problems in applying atomic energy. Will interest forward-thinking people in industry. American Management Assn., 330 W. 42nd St., New York 36. 31pp. $1.25.

PRINCIPLES OF AUTOMATIC CONTROL. In this illustrated booklet the Instrument Society of America, 1319 Allegheny Ave., Pittsburgh, presents a clear and concise picture of the fundamentals of automatic control. 32 pp. $1.25.

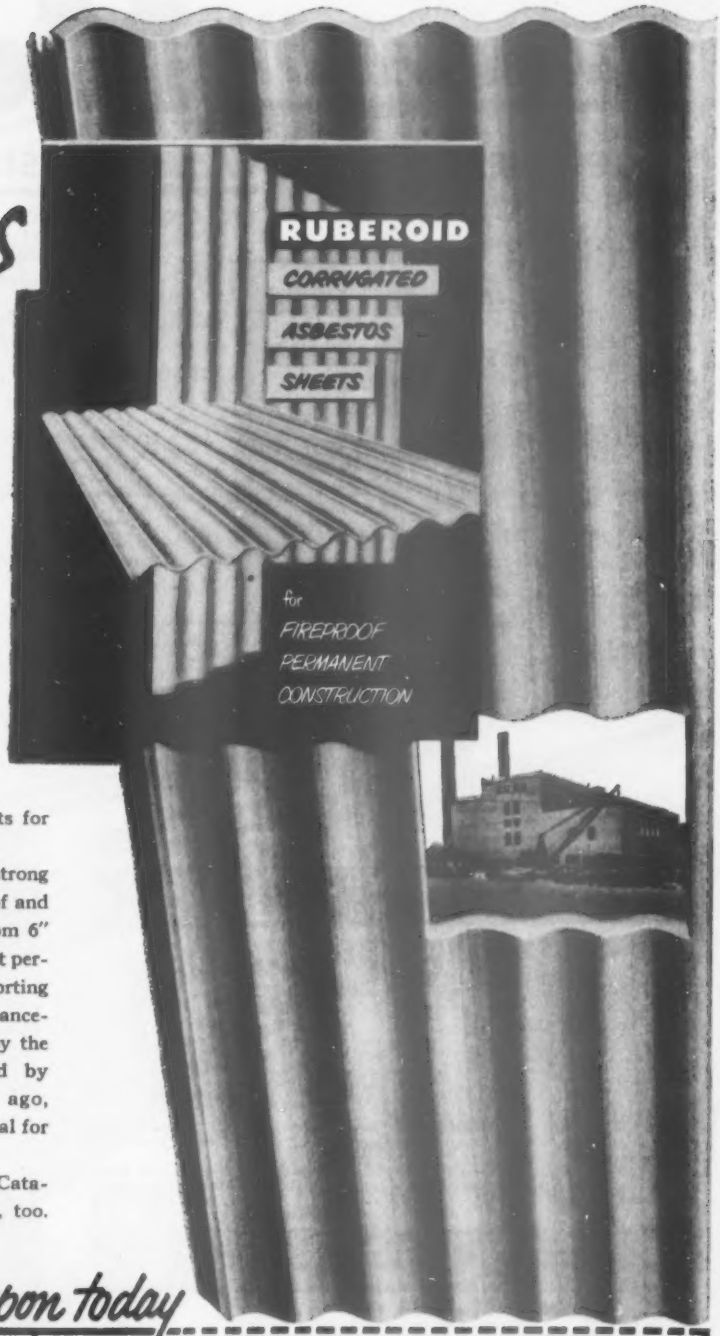
PRESENT PROBLEMS AND FUTURE TRENDS IN LUBRICATION. A review of the development of synthetic lubricants and an appraisal of future demands. NRL Report 4080. Naval Research Laboratory, Washington, D. C. 22 pp. 75¢.

DIRECTORY OF CONTRACT PACKAGERS AND THEIR FACILITIES. Will give your shipping men a quick reference about packaging facilities and equipment of contract packagers, together with information about products that will be accepted or refused. Packaging Institute, 342 Madison Ave., New York 17. 71 pp. $2.

AIR POLLUTION. Three booklets of interest to plant engineers: New and Latest Developments in Outdoor Air Pollution, Scientific Boundaries in Air Pollution Studies, and Measurement of Air Pollution. Compiled by the Industrial Hygiene Foundation, 4400 Fifth Ave., Pittsburgh. 14, 6, and 5 pp. respectively. Free.

WARNING LABELS. A guide for the preparation of warning labels for hazardous chemicals. Illustrates labels for 250 chemicals. Manufacturing Chemists' Assn., Inc., 246 Woodward Bldg., Washington 5, D. C. 98 pp. $1.

FOR *Better Buildings* FASTER



Here's the new "Bible" for industrial builders. Here's where you can learn how to cut building time and costs with Ruberoid Corrugated Asbestos Sheets. Here's where *you* can find 32 pages of specifications, assembly instructions, application photographs and detail sketches . . . everything an applicator needs to know about installing corrugated sheets for roofing or sidewalls.

Ruberoid Corrugated Asbestos is strong and durable . . . fireproof, weather-proof and corrosion-resistant. Pre-cut lengths from 6" to 12' speed construction. Its light weight permits the use of lighter weight supporting members and foundations. It's maintenance-free . . . never needs painting. Made by the famous Eternit process originated by Ruberoid in this country 25 years ago, Corrugated Asbestos is the ideal material for all types of industrial buildings.

Let Ruberoid's Corrugated Asbestos Catalog be your guide to better buildings, too. Write today for your free copy.

Mail coupon today

The **RUBEROID** Co.

ASPHALT AND ASBESTOS BUILDING MATERIALS

THE RUBEROID CO.
500 Fifth Avenue, New York 36, N. Y.

Please send me 32-page illustrated booklet on Ruberoid Corrugated Asbestos construction for roofings and sidewalls.

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE..... PM-1

Team up with Mercury

GET THE JOB DONE FASTER – EASIER – AT LOWER COST

★ **Over 41 Years Experience in the Designing, Manufacturing and Installation of Material Handling Equipment.**

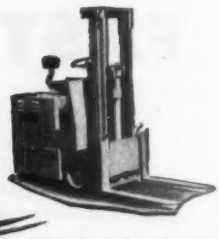
★ **The Most Complete Line of Equipment for BOTH Vertical and Horizontal Handling.**

★ **Originators of the Mercury "TRACKLESS TRAIN" System of Materials Handling.**

FORK TRUCKS

A few of the outstanding quality features of Mercury Fork Trucks include—*simple, single cylinder low* pressure hydraulic lift with patented cross suspension . . . magnetic contactor travel control with foot actuated, timed acceleration and controlled plugging . . . shockless wheel steering by means of compensating, controlled castor type trail axle . . . double reduction unit assembled drive.

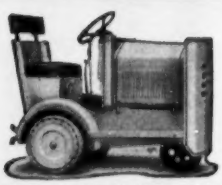
"YAK" FORK TRUCK Model 430
4,000 lbs. capacity



"JEEP" FORK TRUCK
Model 230
2,000 lbs. capacity

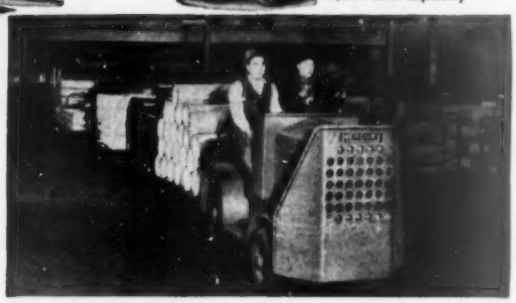
"YANK" FORK TRUCK
Model A-1544
6,000 lbs. capacity

TRACTORS AND TRAILERS



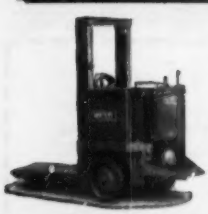
"Tug" Electric Tractor: Available in 3 capacities and 3 wheel, twin-3 or 4 wheel types.
"Banty" Gas Tractor: The smallest tractor made, yet develops a draw bar pull in excess of 2,000 lbs.

Also, "Huskie" and "Super-Huskie" gas tractors, 4 and 6 wheel heavy-duty models.
Trailer: Available in castor, 5th wheel or 4 wheel steer, platform or side dump types.



The Mercury "Huskie" tractor hauling a train of loaded Mercury type A-310 trailers in a large electrical manufacturing plant.

PLATFORM LIFT TRUCKS



Illustrated right is "Shuttle-Truk" 3-wheel burden carrier, 2,000 lbs. capacity. Illus. left is "Standard" high lift truck, 6,000 lbs. capacity.

Complete line includes narrow or wide models rated at 3,000, 4,000, 6,000 and 10,000 lbs. capacity with low, high or telescopic lift.

The Mercury Model A-1006 narrow type 4,000 lbs. capacity high lift truck stacking skids of corrugated paper in a carton manufacturing plant.

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

FREE Bulletin 300, a new 44 page catalog illustrating and describing the complete MERCURY line of Fork Trucks, Tractors, Trailers and Platform Lift Trucks.

MERCURY MANUFACTURING CO., 4110 S. Halsted St., Chicago 9, Ill.

Check the Extra Values in WAYNE COMPRESSORS

1. GUARANTEED FULL-RATED OUTPUT

Full-rated usable air output guaranteed on basis of scientific pre-tests of volumetric efficiency and performance . . . all the air your machines need.

2. JOB-ENGINEERED FOR YOUR PLANT

Designed and built to your individual on-the-job requirements . . . checked for efficiency and operating tolerances . . . minimum maintenance and low operating costs.

3. EXTRA COOLING CAPACITY

Larger number of thinner, deeper fins on cylinder block keep temperatures low. Large combined flywheel and fan direct air on intercooler and after-cooler.

4. LONGER SERVICE PISTONS

Lightweight automotive type pistons eliminate major cause of overheating and high power consumption. Piston lands permit expansion where heat is greatest.

5. WEAR-GUARD LUBRICATION

Revolutionary constant level oiling system assures adequate lubrication even if oil is low in reservoir . . . guards against over-oiling. Less danger of burning out bearings.

FOR LONGER, TROUBLE-FREE SERVICE LOWER OPERATING COSTS—POSITIVE AIR

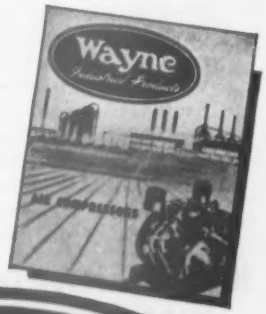
Let the extra values in Wayne Air Compressors go to work for you, for extra production in your plant. From first design to finished assembly, every Wayne Compressor is built to give you extra efficiency . . . more value for your compressor dollar.

Wayne engineering features are aimed at providing a better compressor in every way—cooler in operation, with lower power consumption, higher efficiency, lower maintenance costs, and longer, trouble-free life.

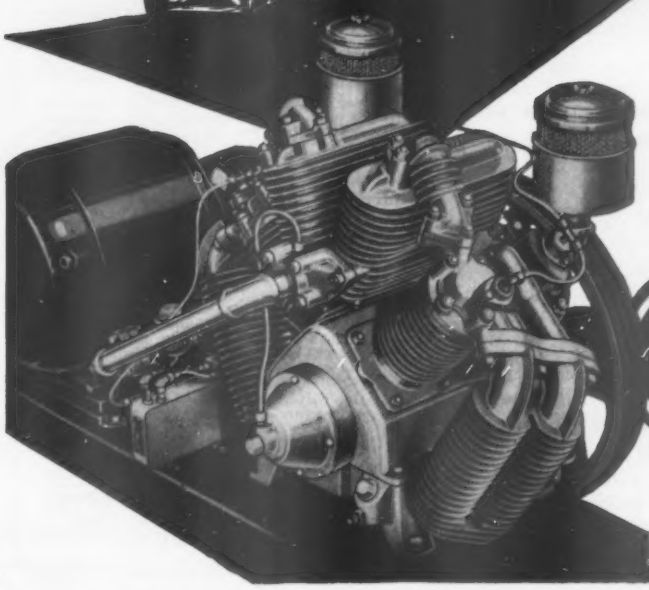
When you buy a Wayne Compressor, you buy guaranteed full-rated usable air output . . . all the air you need for all your machines. And every Wayne Compressor is backed by a nation-wide service organization. Make your next compressor Wayne.

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND • TORONTO, CANADA

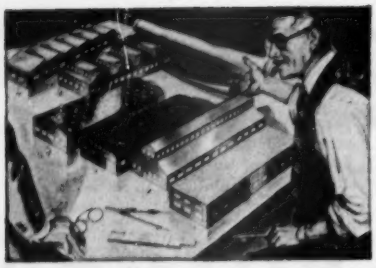


Send today for new illustrated booklet on Wayne Air Compressors.



Wayne

NATION WIDE SERVICE



Write

for this free analysis of industrial roof construction from Robertson's Technical Library

Every architect or engineer who engages in industrial design and construction should have this critical analysis on file. All the better-known roof types (flat, monitor, bowstring, double-pitch, high-low bay, saw tooth) are compared on the basis of weight of structural steel, volume, roofing material, area of vertical sash, flashing required, natural ventilation, and natural daylighting—both intensity and cost. The data involved was computed by an eminent professional engineer for the purpose of evaluating the true cost and comparative efficiency of each roof design. Write for your free copy of this book.

H. H. Robertson Company

2418 Farmers Bank Building
Pittsburgh 22, Pennsylvania

Offices in All Principal Cities
World-Wide Building Service

Please send me free copy of roof construction analysis

NAME_____

ADDRESS_____

CITY_____ F

INDUSTRIAL FILMS NOW AVAILABLE

UNIVERSAL BALANCED POSITIONERS is a 16mm. black and white silent movie comparing other methods of positioning weldments with use of the Aronson positioner. Time studies highlight the comparison. 18 min. For information write:

Aronson Machine Co., Arcade, N. Y.

FREEDOM AND POWER uses animation and live action to trace the development of the power industry in America and anticipate harnessing of atomic and solar energy for future industrial use. Received 1953 Minister of Communications Award (Italy). 16-mm., sound, color, 29 min. Write:

General Electric Co., Schenectady 5, N. Y.

YOU ARE THE PRODUCER explains how you can record your own commentary without laboratory processing, using the RCA 400 magnetic recorder-projector. The 12-min. film shows how to record, play back, reproduce optical and magnetic track. Available from:

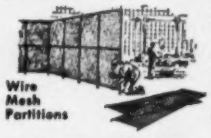
Any RCA Visual Products distributor or the Engineering Products Dept., RCA Victor Div., Camden 2, N. J.

AN ATTITUDE AND AN APTITUDE explains bearing parts and their functions, shows production of ball bearings in a plant where every fourth employee is an inspector. 16mm., black & white, 22 min. Free.

The Fafnir Bearing Co., New Britain, Conn.

THE BULL DOG shows building of tanks in the Cleveland Tank Plant by mass production. Shots include drilling a hundred holes simultaneously and spinning the hull on a lathe to cut the gun turret channel. 16 mm., sound, color,

For complete protection surround your property with a Stewart Chain Link Wire Fence—cover windows and skylights with wire guards—place steel folding gates at doors—protect tools, materials, etc., with wire mesh partitions. Stewart literature tells the whole story. Write for it today. Please mention products in which you are interested.



THE STEWART IRON WORKS CO., INC.
2056 Stewart Block, Cincinnati 1, Ohio
Experts in Metal Fabrications since 1886

Stewart IRON and WIRE FENCES

ATTENTION:

Plant Safety Engineers

Here's How YOU can Prevent Production Losses Caused by Dermatitis . . .

Reduce Medical Costs and Improve Industrial Relations

Dermatitis actually wastes *more* man hours and medical treatment dollars than the more sensational industrial "accidents".* Furthermore, dermatitis cases cause revulsion, not only among afflicted employees, but their co-workers as well.

You can prevent these distasteful situations by providing the *proper* protective garments and *insisting* that personnel in your plant always wear them when in contact with irritating substances.

Gloves are especially important in reducing dermatitis cases and your production managers will thank you for choosing the *right* gloves for each job. Comfortable fit, hand freedom and long wear pay off in employee good will, increased production and lowered operating costs.

PIONEER liquid-tight Stanzoil® gloves, made of oil and acid resistant non-allergic DuPont milled neoprene, are reducing hand dermatitis hazards in hundreds of plants all over the world. 32 safety styles, weights, size and colors . . . PIONEER catalog shows you *at a glance* how to choose the most efficient and economical glove for the job.

Don't risk costly time out — write for complete information today.

**Occupational Hazards, December, 1952*

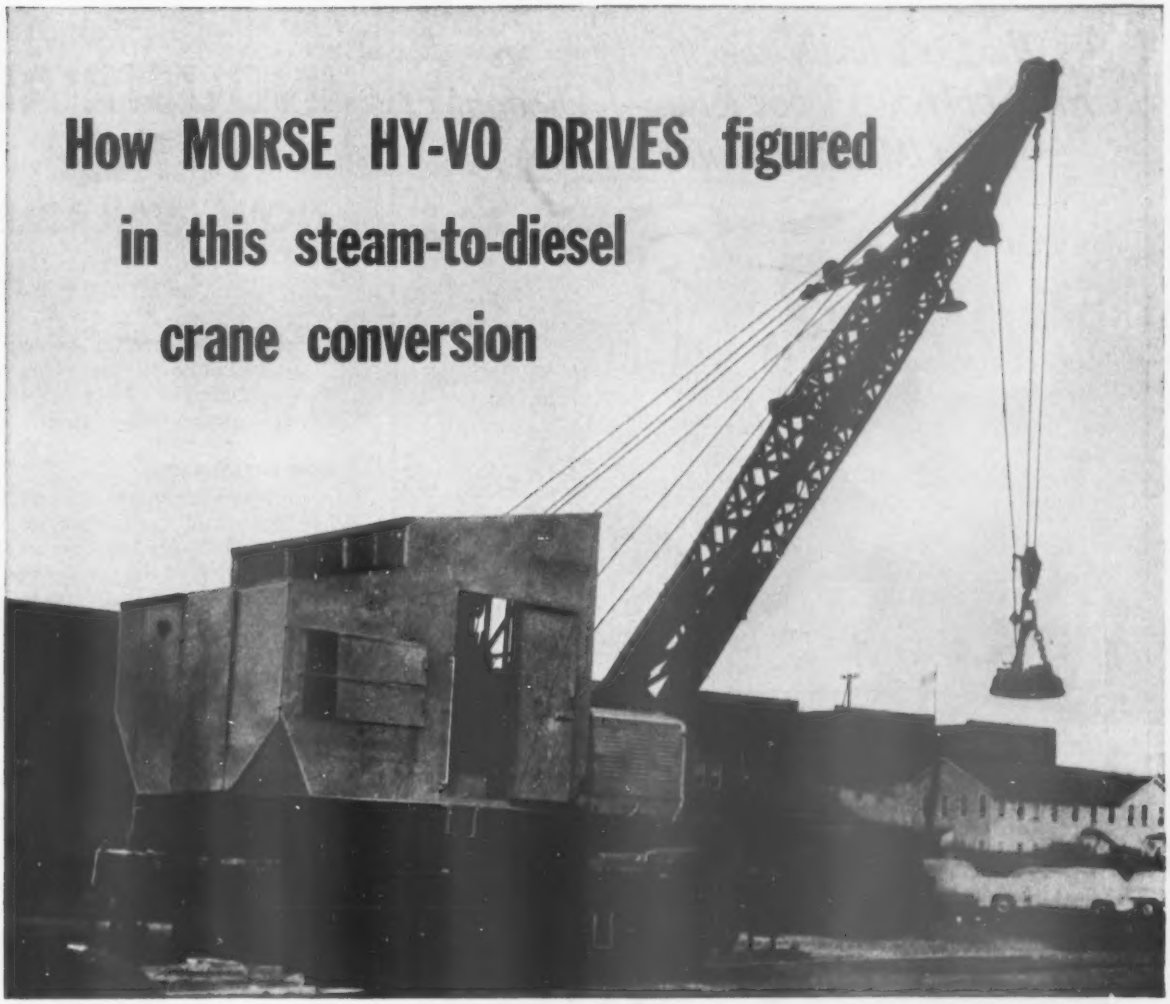
Industrial Products Division

The PIONEER Rubber Company

222 Tiffin Road • Willard, Ohio

Quality Gloves for 35 Years

How MORSE HY-VO DRIVES figured in this steam-to-diesel crane conversion



Inset shows encased Morse Hy-Vo Drives. Note narrowness of drives in relation to 165 hp. power-transmission requirements.

After thirty-four years as a steamer, this Browning locomotive crane owned by Edgewater Steel Company was converted to diesel power.

Its new power equipment: A Cummings 165 hp. engine with a torque converter drives a 1″ x 4″ Morse Hy-Vo Drive, connecting converter output shaft to jackshaft, second reduction is made with a 1″ x 5″ Morse Hy-Vo Drive.

Results: Smoother, more positive control, more reserve power. Operating cost per year cut from $11,232.00 to $7,887.36, a savings of $3,344.64.

Morse Hy-Vo is especially suited to steady or intermittent transmission of heavy loads in cramped space.

In fact, Hy-Vo can transmit up to 5000 hp., run at linear velocities of 6500 fpm. and speeds of 3600 rpm. At the same time, it gives up to one-third longer service life, reduces operating and maintenance costs as much as 50%; runs coolly, quietly, smoothly with less than 1% friction loss. In most instances, it does away with bulky outboard bearings.

With just these few facts in mind, *think* of the advantages in design and function opened to you by Morse Hy-Vo Drive. Write us for details on Hy-Vo in your applications, or let us send you Hy-Vo Catalog C72-51. Morse Chain Company, Dept. 577, 7601 Central Avenue, Detroit 10, Michigan.

M=PT
MORSE *means* POWER TRANSMISSION

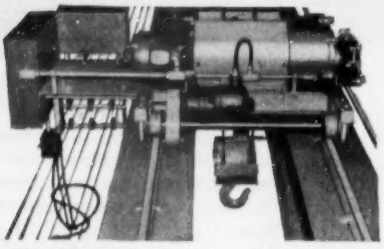
MORSE
MECHANICAL *POWER TRANSMISSION* PRODUCTS

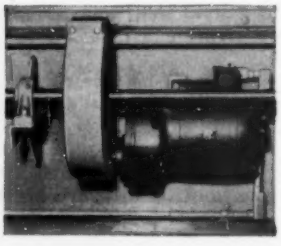
The Boss finally saw the light—no more unknown tapes for us—he bought Trojan IMPERIAL Gummed Tape

Call Your Paper Merchant

THE GUMMED PRODUCTS COMPANY • TROY, OHIO

Investigate the Economy of a EUCLID Utility CRANE





For intermediate demands in material handling, Euclid Utility Cranes meet all requirements.

Here for example, is a 54 ft. span double-girder crane in which the hoist is a standard Euclid unit of long proven merit. Geared head motors of widely accepted high quality are used to propel the bridge and the hoist trolley. Control is by push-buttons from the floor.

This construction provides a crane with a full safety factor of five that measures up to all demands in capacity, performance and serviceability; and also effects economies in first cost, in operation and maintenance.

Write us regarding your requirements.

EUCLID CRANES AND HOISTS Raise Profits

THE EUCLID CRANE & HOIST CO.

1364 CHARDON ROAD • EUCLID, OHIO

INDUSTRIAL FILMS NOW AVAILABLE

Begins on page 280

13 min. For information, write:
General Motors Corp., Dept. of Public Relations, Film Section, General Motors Bldg., Detroit 2.

FILM BIBLIOGRAPHY

A supplement has just been published to bring up to date, as of May 1953, NMTA's Industrial Film Bibliography. For non-members, the original 100-page bibliography, $2; the supplement, 50¢. Write to:
National Metal Trades Assn., 122 S. Michigan Ave., Chicago 3.

SAFETY FILMS

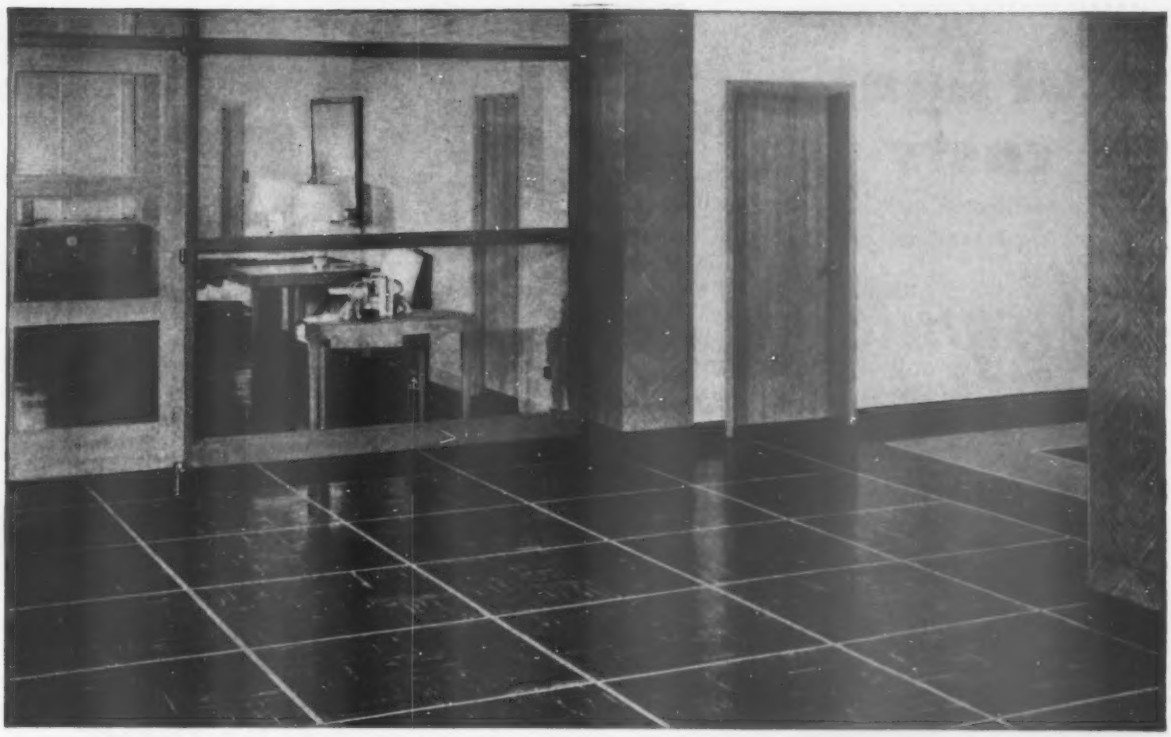
Just published: 1953-54 edition of the National Directory of Safety Films. Lists 963 movies and slide films for training personnel in safety. Also includes first aid, fire prevention, and civil defense titles. Supplements published quarterly. Available (75¢) from:
National Safety Council, 425 N. Michigan Ave , Chicago 11.

FILM PROGRAM OF THE MONTH

GAGES

The following films are suggested for training personnel in the care and handling of gages. They supplement the article on Gage Control on page 112. Titles were selected by the Audio-Visual Center, Washington State College.

FIXED GAGES describes 10 types in detail, shows care and use of each. A U. S. Office of Education film (1942); for engineers, foremen, operators. 16mm., sound, black and white, 17 min. May be rented from your local college



Design a *Cheerful Welcome* into your entrance floor...with Flexachrome*

All of us respond favorably when we enter a building that bids us a bright hello.

And alert management, everywhere, is responding favorably to the advantages of Flexachrome . . . the vinyl plastic-asbestos floor tile that always makes a good impression.

Notice how the handsome, sleek flooring, illustrated, lends an air of quiet, dignified simplicity, so suited to reception areas!

But smart-looking Flexachrome . . . offering 28 rich, bright colors that go all through each tile . . . is also widely used in offices, cafeterias, libraries, corridors and other "dressed up" areas.

And Flexachrome, also *grease-resistant*, is just the floor for kitchens and shops where spilled food, oil, grease and moisture are encountered.

You have virtually endless pattern possibilities with Flexachrome colors and sizes and custom-cut inserts. Maintenance is a breeze . . . just daily sweeping and periodic washing. Flexachrome never needs waxing.

Your local Tile-Tex* Contractor is listed in the classified telephone directory. Ask him about Flexachrome. Or write:

THE TILE-TEX DIVISION, *The Flintkote Company, 1234 McKinley Street, Chicago Heights, Illinois*

Tile-Tex—Pioneer Division, The Flintkote Company, P. O. Box 2218 Terminal Annex, Los Angeles 54, California

The Flintkote Company of Canada, Ltd., 30th Street, Long Branch, Toronto, Canada

*REGISTERED TRADEMARK, THE FLINTKOTE COMPANY

TILE-TEX... *Floors of Lasting Beauty*

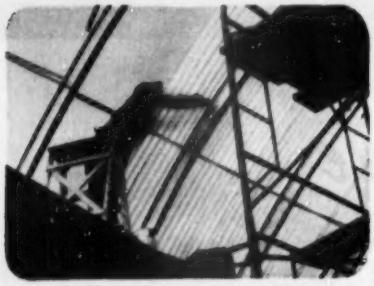
cut light costs

with original shatterproof

Alsynite®

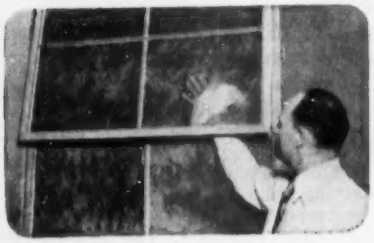
TRANSLUCENT FIBER GLASS PANELS

NOW YOU can use cost-free daylight wherever you want it in new or existing buildings. Simply replace any part of wall or roof with Alsynite panels. Corrugated Alsynite nests with and installs just like corrugated metal. Gives even, diffused light. Installs for less, cuts light bills and eliminates up-keep because it's shatterproof.



NO MORE BROKEN GLASS

End the broken glass problem permanently by replacing glass in standard sash with shatterproof *Flat Alsynite*. Standard sizes. Easy to install. Alsynite is feather-light, can be sawed and nailed. Seven colors.



ALSYNITE COMPANY OF AMERICA
Dept. FM-3, 4670 DeSoto St., San Diego 9, Cal.
Please send me new full color Alsynite folder plus installation detail sheets.
Name _____
Company _____
Address _____
City _____ State _____
Plants in California and Ohio. Distributors in Principal Cities

FILM PROGRAM OF THE MONTH

Begins on page 282

audio-visual center. For purchase, write:

United World Films, 1445 Park Ave., New York 29.

PRECISION GAGE BLOCKS demonstrates how to handle, clean, and store blocks used for setting and checking gages. U. S. Office of Education film (1945). Excellent for training personnel. 16mm., sound, black & white, 18 min. May be rented from your local college audio-visual center. For purchase, write:

United World Films, 1445 Park Ave., New York 29.

HEIGHT GAGES AND TEST INDICATORS is a U. S. Office of Education instructional film (1942) on the use, handling, and storage of the Vernier height gage and the arm-type test indicator. 16mm., sound, black & white, 12 min. For rental, contact your local college audio-visual center. For sale by:

United World Films, 1445 Park Ave., New York 29.

GAGING FOR PROFIT shows practically all modern methods of gaging, including use of gages for continuous measurement. 16-mm., sound, black and white, 38 min. On loan from:

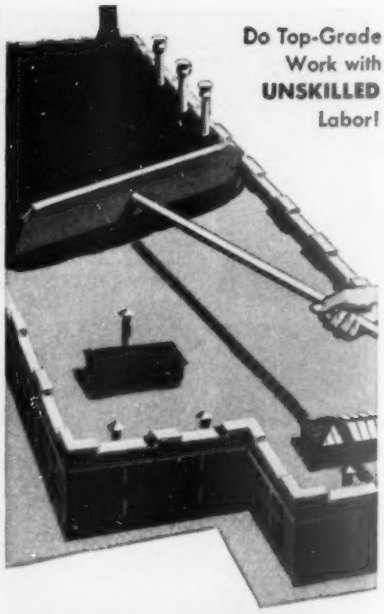
Federal Products Corp., Sales Promotion Dept., Providence, R. I.

WHAT'S THE DIFFERENCE illustrates theory and use of the comparator on production lines in various plants. 16mm., sound, color, 20 min. Free loan from:

Jones & Lamson Machine Co., Springfield, Vt.

SCIENTIFIC PRECISION ACCURACY stresses maintenance of gage blocks and gage instruments. Demonstrates use of the DoAll inspection chart. For foremen and operators. Sound film strip (135 frames). Free.

DoAll Co., Des Plains, Ill.



Do Top-Grade Work with **UNSKILLED** Labor!

NEW METHOD CUTS ROOF REPAIR...

and re-roofing costs in HALF!

You make big savings with Tropical's Roof Maintenance System. Lower cost, unskilled labor easily applies improved cold process materials, without training or special equipment. Because no heat is used, Tropical roofing material does not turn hard or brittle, retains tough plasticity for extra years of service! Ninety percent of leaky roofs can be saved, get added long weather-tight life this way. When re-roofing is needed, Tropical method gives a top-quality roof—cuts costs to the bone!

FREE! **"Saving Old Roofs" tells whole money-saving story on new roof maintenance methods. Your business letterhead request brings a free copy—write today!**

THE TROPICAL PAINT & OIL CO.
1122-1236 W. 70th., Cleveland 2, Ohio

Heavy-Duty Maintenance Paints Since 1883

TROPICAL

Subsidiary of Parker Rust Proof Company

See what adhesives are doing today!

PHOTO COURTESY OF GENERAL MILLS

Putting a good idea to work

Have you t-r-i-e-d Wheaties?

If you have, chances are that it was one of Wheaties' excellent merchandising promotions that influenced you to make your initial purchase. However, there's a lot more to putting across one of these programs than just getting the basic idea. Making the idea work presents problems, too.

For example, consider Wheaties' miniature license plate promotion. Wonderful idea! In this case, a practical idea, too—thanks to a 3M adhesive. To secure metal license plates to packages on a fast-moving production line, an easy-to-apply, fast drying adhesive was required. 3M suggested EC-917. It was tested on the job and proved to be completely satisfactory.

See what adhesives can do for you . . .

This is but one example where a 3M adhesive has helped a manufacturer *put a good idea to work!* Your 3M sales representative would like to help you with your ideas. Why not call him in? Or if you'd like to receive a FREE copy of an 8-page, illustrated folder telling you more about 3M adhesive products, write directly to 3M, Dept. 38, 411 Piquette Ave., Detroit 2, Michigan.

3M COMPANY

ADHESIVES • COATINGS • SEALERS

MINNESOTA MINING AND MANUFACTURING COMPANY
ADHESIVES AND COATINGS DIVISION • 411 Piquette Ave., Detroit 2, Michigan
GENERAL SALES OFFICES: ST. PAUL 6, MINN. • EXPORT: 122 E. 42 ST., N.Y. 17, N.Y. • CANADA: LONDON, ONT.

MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

AN INSPECTION STATION—CUSTOM BUILT with Standard HALLOWELL Shop Equipment

To set up an inspection station anywhere in your plant is a simple operation with HALLOWELL Shop Equipment. All you have to do is design it as you want it and order standard, ready-made units from your HALLOWELL distributor. Write for complete details. STANDARD PRESSED STEEL CO., Jenkintown 11, Pa.

Our Fiftieth Year : A START FOR THE FUTURE

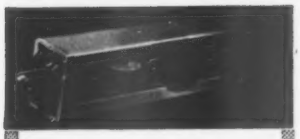
1. Cabinet Benches 2. Stools and Chairs

HALLOWELL SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA

Save Space! Cut Costs!

with R-W "Zig-Zag"®

Continuous Power Conveyor



Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

Richards-Wilcox ZIG-ZAG Continuous Power Conveyors are the last word in materials handling efficiency. Products of many sizes and shapes are carried at various speeds, smoothly and safely. Loss through handling mishaps is reduced to a minimum. And the overhead installation releases valuable space for other uses —increases the efficiency of the plant many times.

ZIG-ZAG—a steel, tube-like track through which travels a specially constructed motor-driven chain—will carry unit loads up to 125 pounds at speeds ranging from 1 inch to 60 feet per minute. It's designed to go up and down, in and around "like water through a pipe." And ZIG-ZAG is flexible, too—if changes or relocation are required you can take it down here and put it up there, and in most cases, *use all the parts!*

* * *

Learn how patented ZIG-ZAG can save space and cut production costs. Send today for details—or better yet, have an R-W engineer consult with you at no obligation.

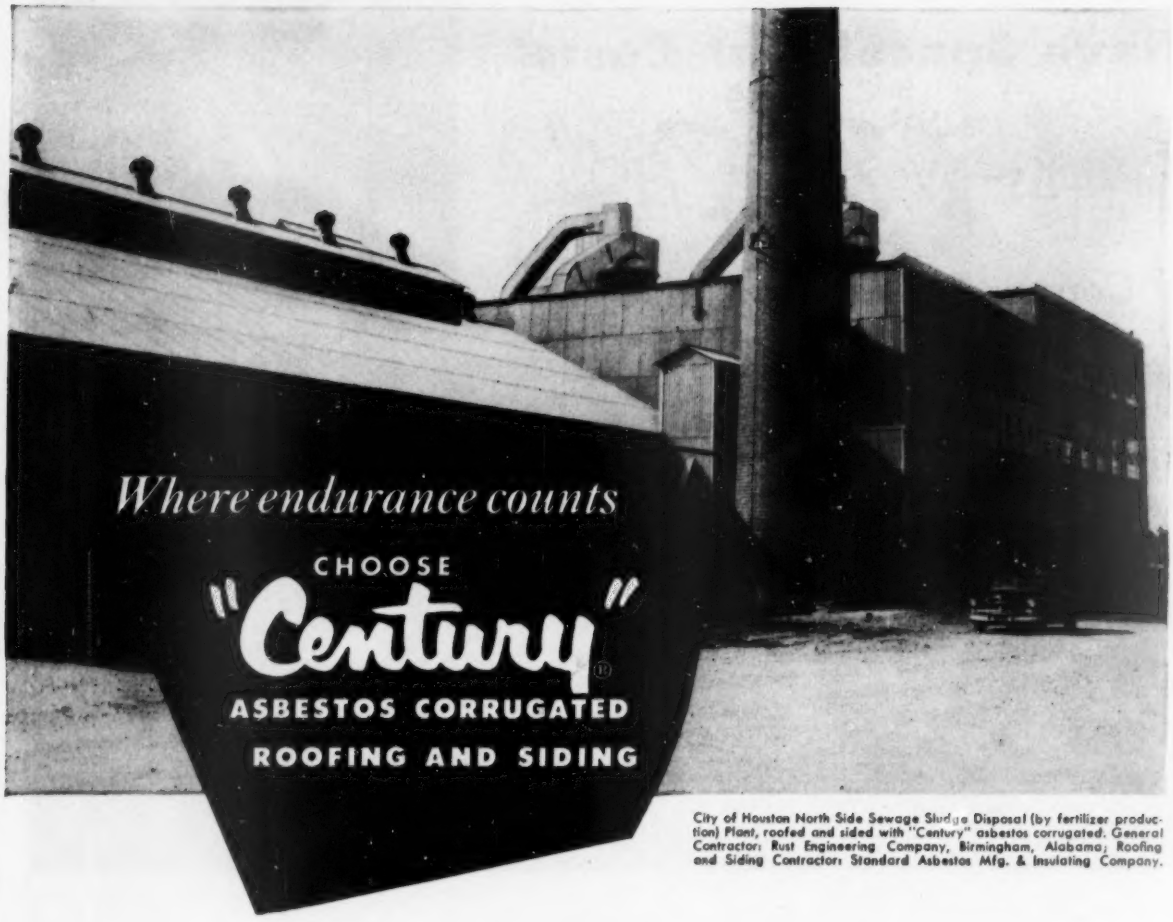
1880 RICHARDS WILCOX R-W AURORA Reg. U. S. Pat. Off. 1953

SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS • ELEVATOR DOOR OPERATING EQUIPMENT

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

410 THIRD STREET, AURORA, ILLINOIS



City of Houston North Side Sewage Sludge Disposal (by fertilizer production) Plant, roofed and sided with "Century" asbestos corrugated. General Contractor: Rust Engineering Company, Birmingham, Alabama; Roofing and Siding Contractor: Standard Asbestos Mfg. & Insulating Company.

Long, long, trouble-free service is a feature of "Century" asbestos corrugated that makes it the ideal roofing and siding for many types of structures.

"Century" corrugated is made from asbestos fiber and portland cement, and so combines the advantages of both materials. It is strong, dense and tough. It *cannot* burn, rot, or corrode. It resists weather, vermin, and insects. And—here's an especially well-liked feature—it needs practically no maintenance during its long life, and it *never* needs protective paint. But that's not all!

"Century" asbestos corrugated is made in standard length sheets up to 12 feet that are easy to handle and store, easy to cut and fit, easy to erect. When TOPSIDE* Fasteners are used, no scaffolding is needed within the building, thereby saving additional time and money.

All these outstanding advantages make long-lived "Century" asbestos corrugated sound like a premium-priced building material. Actually it is one of the most economical materials you can specify!—low in application cost, low in maintenance expense.

Before you build, modernize, or expand a plant, get all the details on "Century" asbestos corrugated! We shall gladly send you complete information.

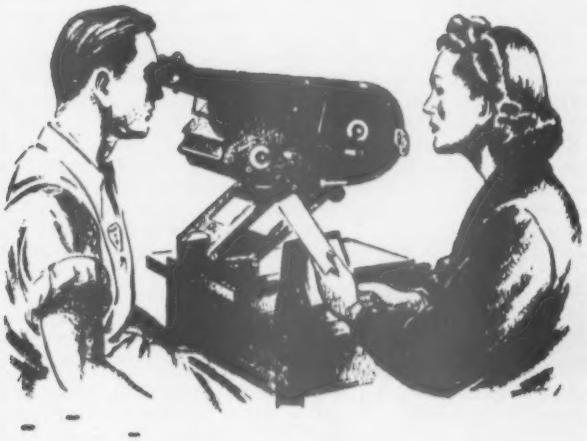
*® H & B Enterprise Corporation

Nature made asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

How to identify the accident-prone workers in your plant



You can benefit from these Bausch & Lomb industrial vision services

1. **Complete Line of Protective Eyewear**—Completely dependable safety eyewear engineered to meet the most rigid tests for every job in your plant. Protection from all types of eye hazards.

2. **Corrective-Protective Service**—Fast, dependable laboratory service in every major industrial area for professionally-prescribed corrective safety lenses for worker comfort and efficiency.

3. **Plant Surveys on Eye Protection**—Bausch & Lomb offers services of experienced safety experts to investigate problems of eye-hazardous operations in your plant and make recommendations for their solution.

4. **Employee Education Programs**—Posters for bulletin boards, pay envelope inserts, other material designed to stimulate interest among workers for eye safety measures; an adjunct to your safety program.

5. **Occupational Vision Service**—A quick, dependable method for relating visual performance of each employee to his job. The Bausch & Lomb Ortho-Rater is especially valuable for identifying accident-prone workers.

6. **Leadership in Optical Science**—For 100 years Bausch & Lomb has been a leader in research and development of products to serve better the optical and visual needs of mankind. All industry is profiting today from this knowledge and experience.

1853/1953 INTO A NEW CENTURY OF OPTICAL PROGRESS

BAUSCH & LOMB CENTENNIAL

More than 25% of all industrial employees are accident repeaters because they are not visually qualified for their jobs. These accident-prone workers are largely responsible for the huge medical and compensation bill industry pays every year.

You can cut your accident costs if you know which workers in your plant are most apt to have accidents. The Bausch & Lomb Occupational Vision Program scientifically points out those employees and job applicants whose visual performance makes them accident risks. Based upon use of the Ortho-Rater, a precision optical instrument for measuring visual performance, it relates visual skills to job requirements and provides a system for improving the visual efficiency of workers—to the profit of both employer and employees.

Hundreds of leading companies have saved many thousands of dollars in accident costs with the Bausch & Lomb Occupational Vision Program. For complete details, contact the Bausch & Lomb Office in your area or send for the brochure, "Eyes Right for the Job": Bausch & Lomb Optical Co., 90120 Smith Street, Rochester 2, New York.

BAUSCH & LOMB *Safety Eyewear*

Savings of 500% in labor reported after switching to TAPE-STRAP®

Here's another instance where packaging costs were radically reduced after switching to the new laminated reinforced filament tape—Tape-Strap.

For several months, Arnold, Schwinn & Company, famous maker of bicycles, has used Tape-Strap with complete success on cartons used to ship bicycle mudguards and metal braces. Using an automatic tape dispenser that dispenses three strips of Tape-Strap in one operation, they report labor savings of 500%. Packaging personnel prefer Tape-Strap over their former method of sealing because application time is cut in half, and it's easier to use.

Tape-Strap has a center layer of resilient, shock-absorbing material that carries, embedded in it, thousands of tiny filaments sandwiched between layers of tough, pliable kraft. Instant, permanent adhesion is assured by a deep coating of finest, water-soluble gumming. Tape-Strap has no sharp edges, thus eliminating the major cause of personal injury to packers.

You can't break Tape-Strap. That's why your packages travel safely, discourage pilfering, cut packaging costs.

APPROVED—Tape-Strap is approved by the Official, Southern and Western Classification Committees (Rule 41, Sec. 8 (b), Supp. 29, C.F.C. No. 19), and by Railway Express Agency, Inc. (Rule 18 Packing Requirements—Sealing). Tape-Strap qualifies for military packaging under specification MIL-T-4601 (USAF).

FREE SAMPLE ROLL—Write for free sample roll, and test Tape-Strap's astonishing strength on your own containers.

Arnold, Schwinn & Company has made labor savings of 500% because they too switched to Tape-Strap.

LEADERS IN THEIR LINE

MID-STATES Gummed Paper Company
2517 S. DAMEN AVE., CHICAGO 8, ILLINOIS

New York • Boston • Philadelphia • Cleveland • Detroit • St. Louis • Atlanta • Los Angeles

---

LEA GRIPMASTER®

Industry's Bonding Cement for Polishing Wheels and Belts

Meets the Toughest Abrasive Grain Bonding Requirements

Gripmaster is well named . . . it holds its grip on the abrasive grains so well that users report greater production per wheel or belt and longer abrasive life.

Why not try Lea Gripmaster on your polishing wheels and belts? Testing under actual operating conditions in your own plant is the only real way to prove a product. We'll stack our Gripmaster up against your most rugged production requirements. Send for a trial order . . . our 75 pound pail or if you prefer, our 4 one gallon unit package?

LEA MFG. CO. of MICHIGAN, INC.
14066 Stansbury Ave., Detroit 27, Michigan
The Lea Mfg. Co., Waterbury, Conn.
Lea Mfg. Co. of Canada, Montreal
Lea-Ronal, Inc., Long Island City 1, N.Y.

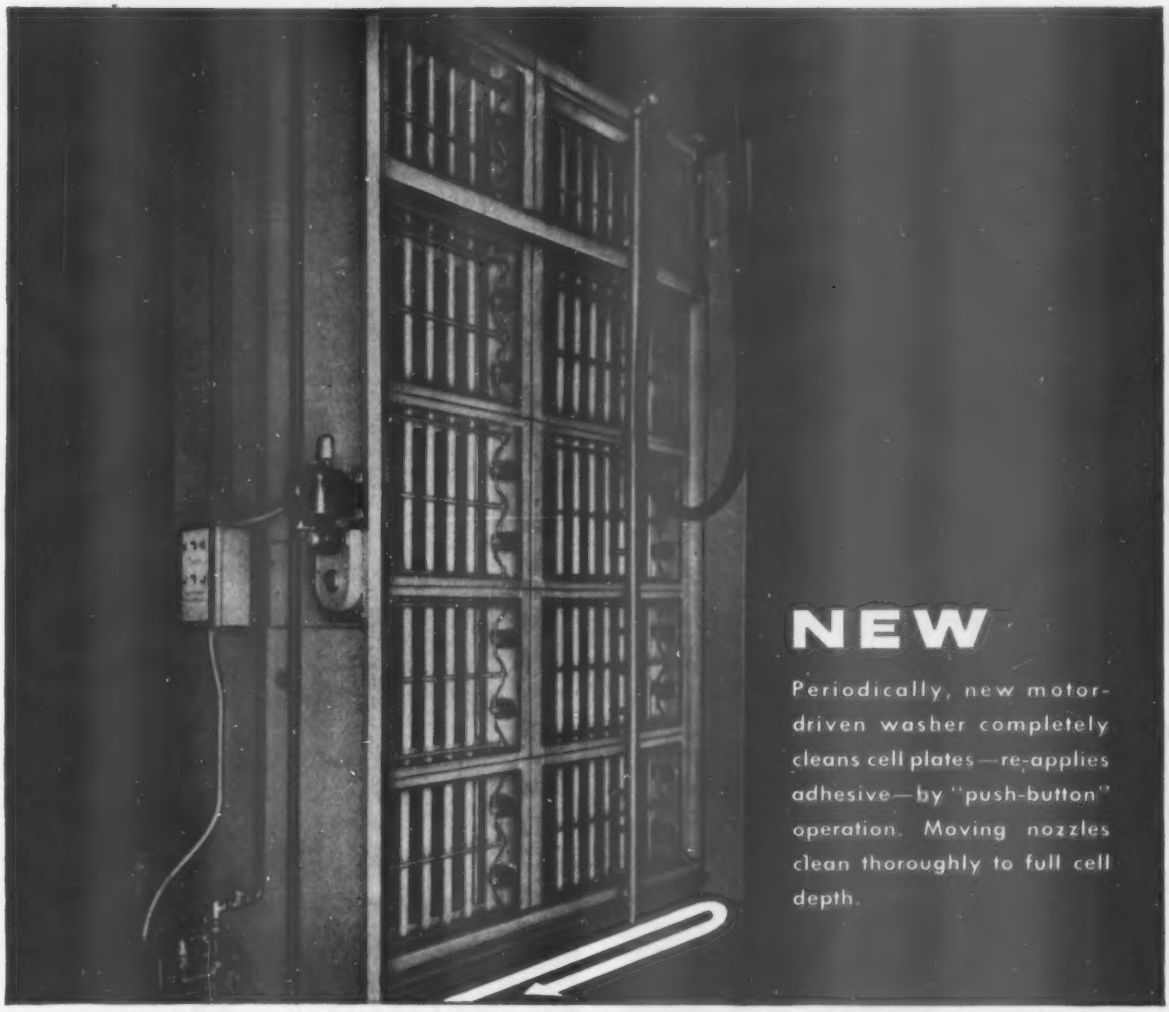
NO MORE SLIPS!

NOW make metal, concrete, and wood floors, staircases, areas around machinery and loading platforms SLIP-PROOF — WET OR DRY.

R-MIR-DEK NON-SLIP COATING is the only lightweight safety floor coating that is Fire retardant, Anti-corrosive, Easily applied, and Oil, Grease, Alkali, and Acid-resistant. Compounded of durable phenolic resins and polymerized oils with everlasting aluminum oxide granules added.

FREE 2-color R-Mir-Dek brochure. Write to Department FM-8.

MIRACLE ADHESIVES CORP.
214 E. 53rd STREET, NEW YORK 22, N. Y.



NEW

Periodically, new motor-driven washer completely cleans cell plates—re-applies adhesive—by "push-button" operation. Moving nozzles clean thoroughly to full cell depth.

NOW—"PUSH-BUTTON" WASHING FOR ELECTRONIC AIR CLEANER

Now, a new, low-cost, automatic PRECIPITRON® washer cuts maintenance costs and eliminates unpleasant inside-the-duct washing of cells.

This unique device features moving nozzles, making PRECIPITRON the easiest electronic air cleaner to service. After thoroughly cleaning the plates, the washer re-applies adhesive. Entire operation is under "push-button" control. Laboratory and field tests have proved that moving-nozzle washing is a "must" for proper cleaning.

Type PX PRECIPITRON, the electronic air cleaner, traps microscopic airborne particles of dirt, dust, grime and pollen which would pass through conventional filters. It fits into any heating, ventilating or air conditioning ductwork.

Learn how PRECIPITRON will keep the air in your building dirt-free at negligible cost. Call your local Westinghouse-Sturtevant office, or write: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

Maintenance men no longer need to enter enclosure to clean PRECIPITRON. New "push-button" feature does away with hot, wet tasks.

WESTINGHOUSE AIR HANDLING

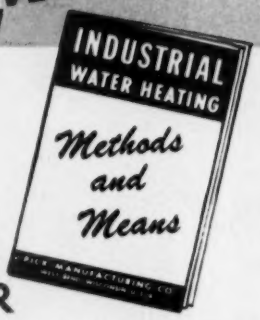
YOU CAN BE SURE ... IF IT'S Westinghouse

J-80231

WAIT!

WE'VE GOT SOMETHING TO GIVE YOU!

Free!

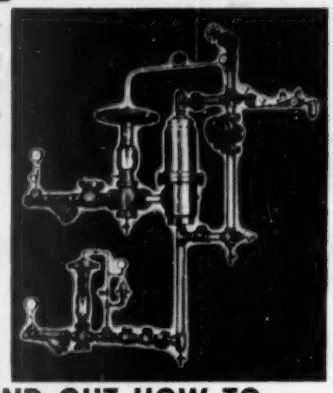


Booklet with the ANSWERS TO YOUR HOT WATER PROBLEMS! NO OBLIGATION

Get the Facts About the Sensational

Pick INSTANTANEOUS WATER HEATERS

Industries all over America are finding Pick Heaters the money-saving answer to their hot water problems. Water is heated INSTANTLY by steam injection to exact temperature desired and in volume needed. Easy to install — no storage tanks required.



FIND OUT HOW TO CUT HOT WATER COSTS...

. . . MAIL THIS COUPON TODAY!

Pick Manufacturing Co., Dept. 333
West Bend, Wisconsin

Without obligation send your booklet on how Pick Heaters cut costs of hot water used for purpose checked.

☐ PRODUCTION ☐ WASHUP ☐ SHOWERS

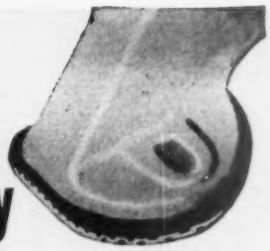
NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

How to install machinery



Faster! Easier! At lower cost!

ISOMODE® PADS permit you to install most machines without bolting, floor damage or costly, heavy bases. Placed under legs of equipment, they absorb impact-shocks and as much as 70% of the vibration. They thereby keep machines in place even without cementing — reduce noise — cut down both building and machine maintenance.

ISOMODE PADS, engineered from Du Pont "Neoprene," last for years. They permit you to locate or relocate machines anywhere, and on all types of flooring. Thousands of effective, money-saving installations have already been made — from bench equipment to high capacity punch presses. Why not try an installation to see the remarkable results first hand? Bulletin 415 gives more data — write today.

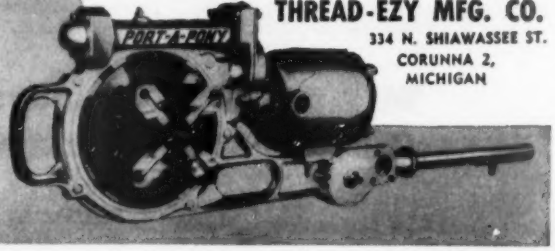
THE MB MANUFACTURING COMPANY, Inc.
1080 State Street, New Haven 11, Conn.

PORT-A-PONY
FEATHERWEIGHT
PORTABLE
PIPE THREADER

Here is a power pipe threader you can carry to the job in one hand. Weighing only 26 lbs., Port-A-Pony offers efficient pipe and conduit threading on all installation and maintenance work. You'll like the way Port-A-Pony threads any ¼" to 4" pipe on the job. The ½ hp reversible motor operates on 110V, AC or DC. Use your present die stocks.

Write for full information today.

THREAD-EZY MFG. CO.
334 N. SHIAWASSEE ST.
CORUNNA 2,
MICHIGAN



COOLITE GLASS makes daylight go a LONG WAY!

Coolite glass affords clean, attractive design in plant of John Baumgarth & Co., Printer, Melrose Park, Illinois. Architect: John S. Cromelin; General Contractor: Clearing Industrial District; Glazier: Hamilton Glass Company.

Printing Craftsmen Find it Easier to Make Good Impressions in Plant Glazed with 12,000 Sq. Ft. of Heat Absorbing Glass

Good printing depends upon a close coordination of hand and eye and Coolite, Heat Absorbing Glass by Mississippi floods the entire work area of this modern plant with copious quantities of conditioned, natural light at low cost. Coolite diffuses light in depth . . . throws it deep into work areas . . . eliminates sharp contrasts . . . reduces eye fatigue . . . cuts costly mistakes.

Translucent, light diffusing figured and wired glass by Mississippi for better daylight illumination is available in a wide variety of patterns and surface finishes, all scientifically designed—"visioneered" —to distribute light to best advantage. Specify glass by Mississippi.

There is no Substitute for **GLASS!**

It is non-combustible . . . won't burn. It is rigid . . . doesn't sag or warp. it has a permanently hard, impervious surface, not affected by time, abrasion or exposure to the elements. It won't corrode or stain. It resists chemicals. It is easily installed, maintained and cleaned by conventional methods.

Send for free Coolite catalog. "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.

MISSISSIPPI *Glass* COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

"NOW YOU CAN MAKE
DRY PHOTOCOPIES
IN ANY COLOR"

RIGHT IN YOUR OWN OFFICE INSTANTLY!

ALL ELECTRIC
APECO SYSTEMATIC Auto-Stat

Makes photo-exact copies of anything typed, written, printed, drawn or photographed in any color or black and white.

Now make photocopies in color! The amazing Apeco Systematic Auto-Stat makes a dry photocopy in red, blue, green, yellow or any other color—including black and white—in less than 45 seconds. Now—"color-code" orders, invoices, letters, etc.—speed up order filling and office procedure—save filing time! This lightning-fast copying machine prints from any original up to 11" wide, any length, whether printed on one or two sides opaque or translucent paper . . . all automatically. Finished copies are ready for instant use. Save up to 80% on copying cost by eliminating costly re-typing, hand copying, checking and outside copying service. Offers even greater savings in increased business efficiency.

SO LOW COST! A complete Apeco Systematic Auto-Stat installation is priced well within the budget of even the smallest firm.

"COLOR-CODE" YOUR PHOTOCOPIES!

Increase office efficiency with copies in any color for immediate recognition, faster filing, speedier handling.

PRE-PRINTED COPIES FOR SYSTEMS USE

Methods experts acclaim new pre-printed Auto-Stat copy system offering simplified office record procedure tailor-made to your particular needs.

HAVE YOU READ THIS FREE BOOK?

American Photocopy Equipment Co. FMM-83
2849 N. Clark St., Chicago 14, Ill.

Please rush me, without obligation, your factual book on "29 ways to save time and money" and the Apeco Auto-Stat story. I understand this free booklet pictures and tells how I can use Apeco Auto-Stat in my office

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

TRY THIS ONE FOR SIZE!
A Typical U. S. Electrical Tool Value

If you use ¼-inch drills compare this U. S. Product, feature by feature, and then compare the price.

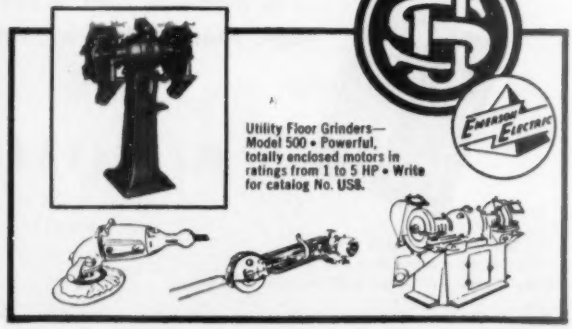
● 100% Full Ball-Bearing Construction ● Rugged Aluminum Alloy Frame ● Alloy Steel Gears ● Jacobs 3-jaw Geared Chuck ● Price..$28.00*

Here is the ideal drill for continuous duty on even the most difficult jobs in automotive, maintenance and assembly work. Extremely powerful, it will not stall in heavy-duty drilling in metal or wood. Cool operating under constant use.

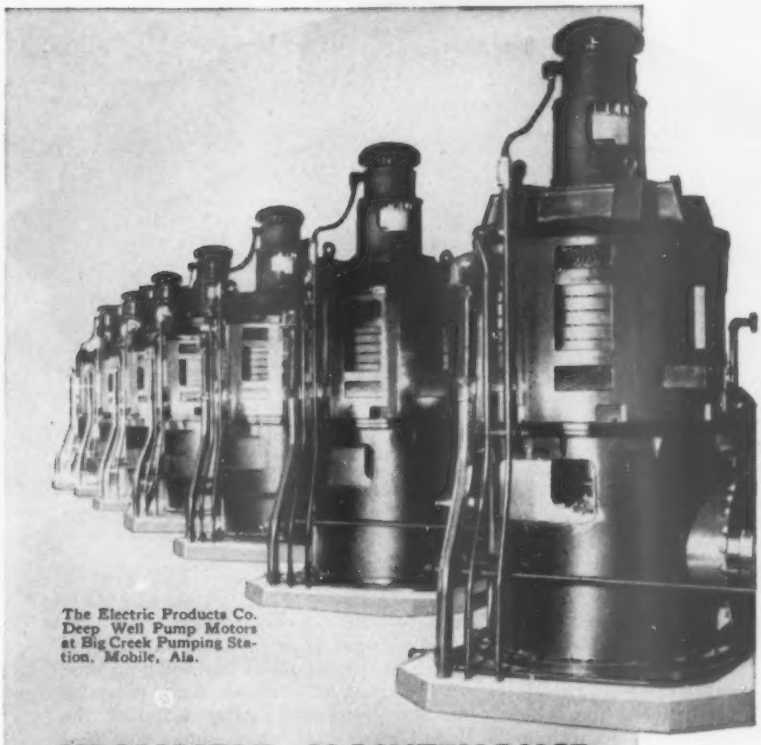
If you are not acquainted with a nearby U. S. Electrical Tool Distributor, or the complete line of U. S. drills, sanders, polishers, grinders and buffers, write us at once for Distributor's name and free catalog No. US8.

**Prices subject to change without notice.*

United States Electrical Tool Division
THE EMERSON ELECTRIC MFG. CO.
1050 Findlay St., Cincinnati 14, Ohio



Utility Floor Grinders—Model 500 • Powerful, totally enclosed motors in ratings from 1 to 5 HP • Write for catalog No. US8.



The Electric Products Co. Deep Well Pump Motors at Big Creek Pumping Station, Mobile, Ala.

NEGLIGIBLE MAINTENANCE under HEAVY THRUST LOAD at HIGH SPEED

The Electric Products Co., Cleveland, Ohio, is one more manufacturer who has found SKF Spherical Roller Thrust Bearings the solution to the problem of anti-friction support of heavy thrust loads at high speeds, and perfect lubrication.

Here, for example, are seven Electric Products 800 hp, 900 rpm deep well pump motors in operation at the Mobile, Ala., Big Creek Pumping Station. Under severe thrust load, high speed operating conditions, the SKF Spherical Roller Thrust Bearings in this equipment have been delivering excellent performance with negligible maintenance.

with SKF SPHERICAL ROLLER THRUST BEARINGS

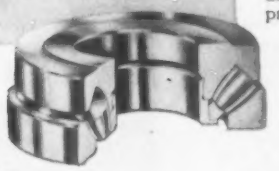
Here are the reasons why more and more equipment designers are specifying the SKF Spherical Roller Thrust Bearing:

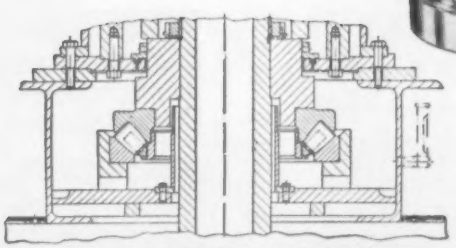
1. The bearing has very high capacity for thrust loads, and combined loads which are predominantly thrust, especially on vertical shafts . . . and can operate at high speeds.
2. It is fully self-aligning—a single row of spherical rollers roll on a spherical outer ring with full self-alignment.
3. Its inherent design is such that lubricant is pumped outwardly along the rollers against the high guide flange on the inner ring. This action assures perfect lubrication, low friction, long, trouble-free life.

SKF Bearings are serving virtually all industry. SKF's unmatched Field and Home Office engineering service helps product engineers *put the right bearing in the right place.*

7418

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
manufacturers of **SKF** *and* HESS-BRIGHT *bearings.*



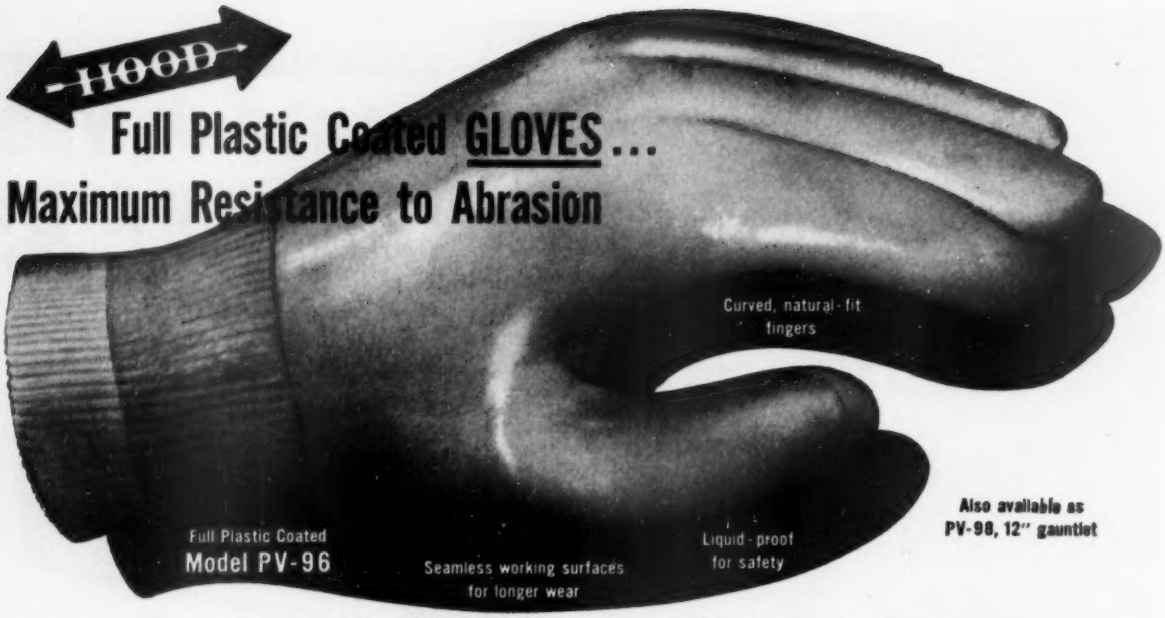


Cross-Section of SKF Spherical Roller Thrust Bearing as designed into the Electric Products Co.'s vertical motors at Big Creek

SKF®
BALL AND ROLLER BEARINGS

HOOD

Full Plastic Coated GLOVES...
Maximum Resistance to Abrasion



These Hood gloves with *fully* curved fingers give greater comfort, plus maximum resistance to abrasion and wear. Made from a new, scientifically compounded formula which results in a perfectly fused film, these new gloves have a uniform coating with no weak spots. Both benefits have been proved by Hood's "on-the-job" testing.

Hood makes a complete line of industrial rubber and plastic gloves that will help keep your safety standards high. Write today for our new illustrated catalog featuring the Hood Glove Guide, which shows you "how to choose the RIGHT Glove for EACH job".

HOOD RUBBER CO., Watertown, Mass.

LIGHTS THE VITAL SEEING ZONE

Specially designed for machine tools, assembly and inspection benches

FOSTORIA LOCALITES

The finest of All Localized Lighting Units

MODEL 099-PX-412

Overall length 35½". Three instantly adjustable joints.

$13.28 EACH in package of 6 Single Units $16.60 Each

- **All Wiring Fully Enclosed**—completely protected from wear or insulation damage from oil and fumes
- **Adjusta-tension Joints**—tension easily adjusted for freedom of arm movement to suit worker and job
- **Universal Base**—mounts on outlet box or directly on machine or bench. Toggle switch included
- **Reflector** accommodates 100 watt or any A-19 or A-21 medium base screw lamp
- **Baked Enamel Finish**—Exterior, Vista Green—Reflector Interior, high temperature White

Nearly a Million Now in Use

Write for complete catalog of Localite models with various type reflectors, arms and bases for every industrial use.

LOCALITE fostoria for Light ON the Job

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO

Localites available through wholesalers everywhere

NEWCOMB-DETROIT

PIONEERS IN ENGINEERING, MANUFACTURE & INSTALLATION OF

INDUSTRIAL OVENS
•
SPRAY BOOTHS
•
PARTS WASHERS
•
DUST COLLECTORS
•
HEAT and AIR SYSTEMS

ESTABLISHED 1912

- DETROIT DIVISION
- GRAND RAPIDS DIVISION
- NEWCOMB INDUSTRIES, LTD. WINDSOR DIVISION

For Bulletins and Quotations, Wire, Write or Call—
NEWCOMB-DETROIT
5751 Russell St., Detroit 11, Mich.
TR 3-2100

Expert INSPECTION ASSURES EFFECTIVE Cost Saving SASH MAINTENANCE

Sealing windows against weather and restoring deteriorated sash and sills are vital services performed by the Tremco Man. Backed by a quarter century of experience and knowledge, he is seasoned in sash maintenance ... he knows the most effective restoration methods for your particular problem. At no obligation your Tremco Man will thoroughly inspect all window areas and offer you sound, cost-saving recommendations for:

1. Reglazing sash with specially developed cost-saving techniques.
2. Reconditioning bowed metal sash and warped ventilators ... and stopping deterioration with anti-rust measures.
3. Restoring spalled sills ... and sealing window areas against moisture seepage.

The Tremco Man's valuable service includes instructing your own crews in economical cost-saving methods or recommending a reliable contractor. There is a Tremco Man near you.

WINDOWS MADE WEATHERTIGHT AT A SAVING IN LABOR

Resetting of panes was avoided when bedding putty failed on the sash at the plant of Goddard & Goddard, Detroit. On this building Tremco Man J. N. Cassella recommended scraping out the deteriorated bedding putty and "needle glazing" between the metal and glass. Anti-rust treatment of metal provided complete protection. Leakage has been stopped at a saving.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

* The Tremco Man can also help you solve problems involving roofs, floors, water repellence and interior and exterior painting.

25 YEARS OF 1928 TREMCO 1953 KNOWING HOW

THE TREMCO MANUFACTURING COMPANY, Cleveland 4, Ohio • THE TREMCO MANUFACTURING COMPANY (Canada) LTD., Toronto, Ontario

Ruggedly Safe

—to do any jacking job better!

SIMPLEX JACKS

Re-Mo-Trol HYDRAULIC PULLERS

(PUMPS AND REMOTE CONTROLLED RAMS)
10 to 100 ton capacities

**UNIQUE "CENTER-HOLE"* ** minimizes rigging and set-up—provides more effective power.

Simplifies tough pulling jobs! Pull rod or screw is drawn *through* ram plunger in straight, torque-free pull. Ram is own backup. Also lifts or presses.

*"Center-Hole" in rams of 30 ton and greater capacities.

RATCHET LOWERING JACKS

Lift or lower the load notch by notch. Cannot be tripped. *Toe* has *same capacity* as cap! High lift with minimum clearance means less set-up, less blocking. Single or double acting. 1½ to 20 ton capacities.

HYDRAULIC JACKS

Fast, easy power! Operate vertically or horizontally with same efficiency. Tested to 50% over rated capacity. Single or double pump models; 3 to 100 ton capacities.

SCREW JACKS

Cap floating on single chrome-moly ball reduces friction 88%. Forged cap corrugated for safety. Malleable iron base flared for stability. Four-way or ratchet heads. 10 to 24 ton capacities.

Other SIMPLEX JACKS include:

Simplex-Jenny Hydraulic Pullers
Push and Pull Jacks and Accessories
Reel or Drum Jacks
Trench Braces
Timber Braces

WRITE FOR GENERAL CATALOG No. 53

Simplex
LEVER • SCREW • HYDRAULIC
Jacks

TEMPLETON, KENLY & CO. 2517 Gardner Road, Broadview, Illinois

McGRAW-HILL TECHNICAL WRITING SERVICE

TWS offers you a single INTEGRATED publishing service prepared to undertake a project from research and planning through finished manuscript and art, typesetting, mechanical preparation, printing and binding. Whatever the situation, whatever the type of literature you need, our editorial and art consultants can help you, bringing to your most specialized job the craft and skill of publishing experts.

WRITING EDITING ILLUSTRATING PRINTING

TO YOUR OWN OR GOVERNMENT SPECIFICATIONS

Whether you need an instruction book or service manual, to accompany your equipment, written to government specifications . . . . . or product catalogues or training booklets . . . or annual reports . . . or company histories . . . our writing staff can do the job for you, our artists can create and execute the illustrations. And McGraw-Hill printing, binding, and paper resources are among the best in the country.

SAVE MONEY AND TIME

LET OUR STAFF BE YOUR STAFF FOR TECHNICAL and BUSINESS PUBLICATIONS

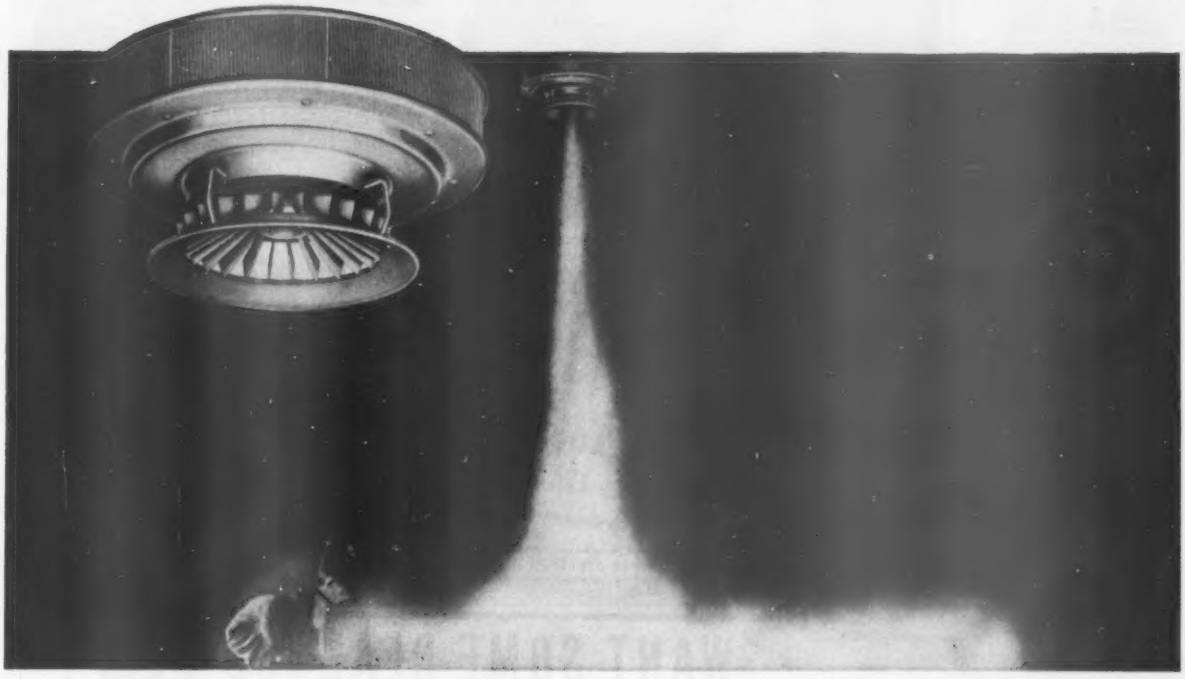
ASK OUR REPRESENTATIVE TO CALL

Write • Phone

Technical Writing Service
McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. 36, N. Y.
LOngacre 4-3000

DRAMATIC SMOKE TESTS PROVE . . .

you can produce unlimited heating patterns with a single Trane Projection Heater



1 Smoke tests show how you can throw heat down to worker level in a concentrated stream. The patented Louver Cone Diffuser makes the difference.

With the diffuser you can mount this TRANE Projection Heater as much as 60% higher in craneways, aisles and bays. It reclaims waste ceiling heat . . . pinpoints warmth on work areas far below.

2 To spread a gentle flow of heat over a wide area, simply close the Louver Cone blades. The TRANE Projection Heater then turns the heat outward from the top of the Louver Cone.

3 Without a diffuser, heat is forced down with a swirling motion . . . diffuses rapidly. This powerful standard unit becomes far more versatile when you add the Louver Cone Diffuser.

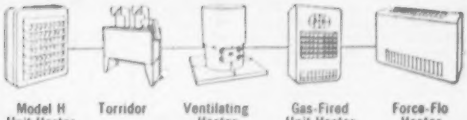
4 To flood an assembly line or general production area with a constant flow of warm air, adjust the individual Louver Cone blades at angles to deflect the heat to match the area below.

5 To warm two areas at once, you can adjust the Louver Cone blades to pinpoint part of the heated air straight down, yet diffuse the remainder outward in any direction you wish.

Laboratory smoke tests show graphically the versatility of TRANE Projection Heaters. With simple fingertip adjustments you can set the exclusive Louver Cone Diffuser to warm dozens of hard-to-heat factory areas in winter . . . provide better air circulation in summer. For complete information, write for free bulletin DS-327B.

Spot heat where you need it with . . .

TRANE Unit Heaters



Model H Unit Heater | Torridor | Ventilating Heater | Gas-Fired Unit Heater | Force-Flo Heater

The Trane Company, La Crosse, Wis. • East. Mfg. Div., Scranton Penn.
Trane Co. of Canada, Ltd., Toronto • 87 U. S. and 14 Canadian Offices

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING AND VENTILATING EQUIPMENT

If your company is small

—here's how to win and keep

GOOD LABOR RELATIONS

You can put your labor policies in good shape if they need it—prepare to protect your interests in bargaining and disputes—**even if you only employ a handful of people.** This book picks the best methods for you, out of the experience of hundreds of actual companies in the small business range. It tells you why even the smallest company must have **policy** and what it should cover—how to strengthen your labor position every day the plant is open—and what you need to know to hold your own in dealing with trained and experienced union representatives. It deals with contracts, strikes, important key points. Use it to prepare yourself **now**—it will more than pay its way if labor troubles come.

Just Published

SUCCESSFUL LABOR RELATIONS for SMALL BUSINESS

HERE's a book that tells the small company what it can do **within the limit of its resources**—what to expect in labor relations and union organizational situations, and how to face the problem in a planned, consistent, foresighted way. It shows you what other small companies have done effectively, in problem after problem that comes up time and time again.

By James Menzies Black and J. George Piccoli
Associated Industries of Cleveland
415 pages, $6.00

- **What ARE your personnel policies, and how are they recorded?**
- **Do you need to do anything about working conditions and other employee relation matters?**
- **What should you do if someone wants to organize your plant?**
- **What should you do to get best results in negotiation?**
- **How can you get the best new contract?—improve an existing one?**
- **What should you do if faced with a strike?**

"The viewpoint throughout is practical, with detailed how-to-do-it information."

Factory Management and Maintenance

These are some of the questions that have been found vital, **even where companies thought they were small and secure from labor troubles.** And, along with many more detailed ones, they are answered in this book.

It's practical, clearly-written, filled with illustrative examples. See it today for facts **that might well keep you in business** tomorrow.

10 DAYS' FREE EXAMINATION

McGraw-Hill Book Co., 330 W. 42 St., NYC 36

Send me Black and Piccoli's Successful Labor Relations for Small Business for 10 days' examination on approval. In 10 days I will remit $6.00, plus few cents for delivery, or return book postpaid. (We pay for delivery if you remit with this coupon; same return privilege)

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position FAC-8

This offer applies to U. S. only

CUT YOUR SWEEPING COSTS

Wilshire POWER SWEEPERS — SWEEPING THE COUNTRY

75% WILSHIRE POWER SWEEPERS

Free DEMONSTRATION PROVES IT

If you are still sweeping by hand, you are paying for a WILSHIRE Power Sweeper...so why not *own* one? There is a WILSHIRE model for every sweeping requirement . . . inside and outside. Easy to operate, easy to maintain and WILSHIRE sweeps 8 to 40 times faster than a man with a broom. Users in hundreds of different industries are saving as much as 75%. Write or wire for illustrated brochure and data on savings you can make.

WILSHIRE POWER SWEEPER COMPANY • 526 W. Chevy Chase Drive • Glendale 4, Calif.

WANT SOME REAL JOB HELP?

Here's a list of reprints which have already proved their value to Factory readers.

The subjects covered in these reprints are varied. Many of them you might wish to have for your own personal library. Others you may want to order in larger quantities for distribution to people in your organization. All the articles listed here are in stock, in limited quantities. First come, first served.

How to Use Your Time Better
How to Improve Your Memory
How to Rough Sketch Your Ideas on Paper
How to Read Faster and Better
Tips on Talking Better
How to Improve Your Writing*
Work Sampling**
Sonic Energy**
How You Can Use Radioisotopes**
How Good A Leader Are You At Getting Better Production
How to Pick People Better
Telling Employees Where They Stand
How Good a Leader Are You
Your Ideas: How to Put Them Across
Six Steps to Inspection Management
How to Solve Your Parking Problems
Make Statistical Methods Easier to Understand
Organizing for Disaster
How to Protect Your Plant
Joe's Department—Emergency Power Set
Disaster Without Warning
How Fixed Variable Cost Control Helps Produce Profits
Special Report on Incentives for Supervisors

Prices for all reprints listed above, except those starred, are:

Single copies—35¢ each	*Single copies—35¢ each
100-299 copies—25¢ each	100-299 copies—30¢ each
300-499 copies—20¢ each	300-499 copies—25¢ each
500 copies up—15¢ each	500 copies up—20¢ each

**Single copies—50¢ each • 100 copies up—35¢ each

Shipping charges will be added to all orders for over 50 copies

FLEXIBILITY

of electrical components...of structural units

Another reason why most control center buyers specify WESTINGHOUSE

No matter what type and size of motor control you need, you can house it in a Westinghouse Control Center. That's not so unusual in itself. But, the important thing is the ease with which these control units are initially installed and then interchanged as circuit requirements change.

The secret is in the standardization of cubicle dimensions. The height of these units are 14″ or multiples of 14″. Thus, all units are completely interchangeable. One 28″ unit can replace two 14″ units—three 14″ units can replace one 42″ unit—etc.

Standardization of vertical structures also aids flexibility. You can arrange, rearrange, add or subtract vertical structures to meet any requirement. Each structure dovetails perfectly with its neighbors.

Need help? Westinghouse offers you the services of an application engineer to work with you on your control center planning. Call your local Westinghouse office today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-27023-A

YOU CAN BE SURE...IF IT'S

Westinghouse

Communist machine-gun fire dropped him in combat. But whole blood kept him alive, saw him through the hospital. He thanks you for his life.

She'd been exposed to polio. A new serum, *Gamma Globulin*, made from blood, helped ward off the dread disease. She thanks you for her life.

A tornado whipped suddenly across her home town. She was badly injured by falling debris. But a quick operation, several transfusions pulled her through. She thanks you for her life.

Three grateful people say: "we're HERE... because you were THERE!"

Each one of these people is alive today because someone gave blood.

If you've given blood before, you know how easy it is—how quick and painless. And you know what a wonderful feeling it is when you realize that what you've done may give another person his life.

Now you are asked to give blood . . . again and again. And you can do it safely every 3 months.

Because America's need for blood has increased enormously—for our armed forces, for accident and disaster victims at home, for new disease-fighting serums.

Many a life hangs in the balance! Will you help? Call your Red Cross, Armed Forces or Community Blood Donor Center today!

BUSINESS EXECUTIVES CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLANT BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOODMOBILE MAKE REGULAR VISITS?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

GIVE BLOOD

...give it again and again

Changing Address ?

- If you are planning to move, please be sure to let our Circulation Department know about it — and as far in advance as possible.
- It takes time to correct the stencil addressing plate and to make the correction on all our records. So your prompt notification will help us make sure you do not miss copies of FACTORY.
- Be sure to give us your OLD address as well as your NEW address. We need them *both* to make the correction — *also confirmation of your company connection and position.*
- Mail in the coupon if you plan to move. And please fill it in as completely as possible.

THANK YOU!

Circulation Dept.
FACTORY Management and Maintenance
330 West 42d St.
New York 36, N. Y.

Change of Address Notice
(PLEASE PRINT)

On or about _____

my NEW address will be . . .

Street _____

City _____ Zone _____

State _____

Position _____

Company _____

No. of Employees _____

My OLD address was . . .

Street _____

City _____ Zone _____

State _____

_____
Name Here

Just listen to how one user puts SCHRAMM to work . . .

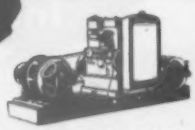
"Our Schramm 105 is operating 16 hours a day", writes H. J. Lockwood, Plant Superintendent, Mullenbach Electrical Manufacturing Company, Los Angeles, "and during the day shift is on a 75% duty cycle.

"Considering that our usage of air at the time of the installation a year ago was 15% duty cycle, you can see how we have put air to work for us".

Schramm Stationary Air Compressors are chalking up similar performance records elsewhere. Users mention their "economy of operation", their "versatility", their ability to be used as a "unit system" installation.

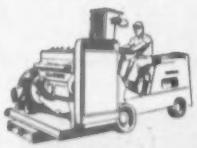
You too will find Schramm Air Compressors offer many advantages and provide real savings. For further information on our complete line of air compressors write today.

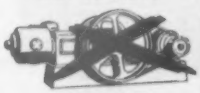
SCHRAMM, INC.
The Compressor People
WEST CHESTER • PENNSYLVANIA


COMPLETE PACKAGE

COMPACT

UNIT SYSTEM


EASY TO MOVE


ONE COST

VIBRATIONLESS

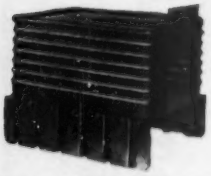
LOW MAINTENANCE

LOW INITIAL COST

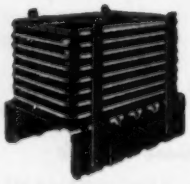
Preferred Throughout Industry

Republic
STEEL BOXES AND SKIDS

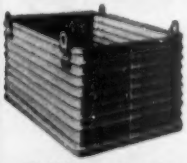
● Designed to give maximum strength and rigidity, Republic Steel Boxes and Skids are preferred throughout industry for their ability to carry the load and keep things moving. Specify "Republic" when you want the best in steel boxes and skids.



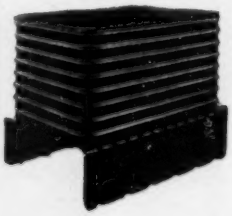
Type PB-650 box and platform unit with sliding end door.



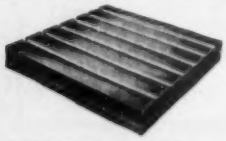
Type PB-120-L box and platform unit with full lifting lugs.



Type PB-80C box unit equipped for crane handling; corrugated bottom.



Type PB-120 steel box and skid platform unit.



Double face steel pallets; no sharp edges; economical.

Type P-1 skid platform in your choice of standard widths, lengths and clearance heights.

Write for illustrated catalog describing the complete line of Republic Steel Boxes, Skids, Pallets.

PRESSED STEEL DIVISION
REPUBLIC STEEL CORPORATION
6222 TRUSCON AVE. • CLEVELAND 27, OHIO

EVERYTHING IN AIR CONDITIONING
U.S. AIRCO

Gas Fired Unit Heater

55,000 to 500,000 B.T.U.

Write Dept. FM853

FOR USE WITH
→ NATURAL,
→ MANUFACTURED,
→ MIXED,
→ LPG AND LP GAS AIR MIXTURES

U.S. AIRCO
UNITED STATES AIR CONDITIONING CORP.
MINNEAPOLIS 14, MINNESOTA

Manufacturing Vice President
Age 55 to 60

Our company is a highly regarded industrial equipment manufacturer, well-established in a desirable city and has annual sales exceeding $25,000,000.

We plan to add to our top management group of long standing an experienced manufacturing executive who will develop our capable, young manufacturing organization. This is an excellent opportunity for a top executive to round out his manufacturing career with a prestige company and be assured of the security of a liberal retirement plan.

$30,000 to $40,000

In order to qualify for this opportunity, the right man will have strong and recent experience as Manager of a large plant or Manufacturing Vice President, and be accustomed to compensation exceeding $25,000 a year. Product experience is not as important as proven ability to direct large scale manufacturing operations.

Confidential replies may be brief. Include name, age, present position and home telephone number.

P-8570, FACTORY MANAGEMENT & MAINTENANCE
330 W. 42nd St., New York 36, N. Y.

HOW 35¢ CAN HELP YOU DO A BETTER JOB

Wouldn't you like to have—right in your own file—copies of complete, authentic articles on important Plant Operating subjects? You *can*. That's why FACTORY prints its famous Plant Operation Libraries.

They are 12- to 36-page articles reprinted from FACTORY's own pages. Many have been widely used by some of the largest manufacturing plants in the country.

And the price is low—only 35¢ each, except as noted in the list below. Pick the subjects you're interested in and order as many as you need. You can use the handy coupon.

Maintenance

112. The Management of Maintenance
113. Principles of Maintenance Control
129. Keep Your Plant Up—Keep Your Costs Down
136. How to Get Your Maintenance Money's Worth
137. How to Build a Maintenance Program Now to Fit the National Emergency
139. Maintenance Control that Really Controls
140. How to Boost the Maintenance Department's Productivity—*50¢*
144. What Should Maintenance Cost?—*50¢*
145. How to Find and Control Your Maintenance Costs

Plant Layout

15. Plant Layout
125. Adopt the Best in Plant Layout—*50¢*

Plant Services

96. Air Conditioning
103. Fire-Fighting Equipment
118. Painting the Plant
131. Making Fullest Use of Mechanical Service Equipment
142. Planned Lighting—*50¢*
143. How to Care for Your Built-Up Roof
146. Today's Lubricants

MAIL THIS COUPON

Industrial Relations

45. Foremanship Fundamentals
47. The Foreman on His Job
102. When Foreman Deals With Worker
106. Better Vision for Greater Efficiency
115. Profit Sharing Plans in Industry
117. How to Plan and Run Open House
128. Providing the Best in Employee Training

Production Methods

38. How to Rate Jobs and Men
86. Motion-Time Standards
109. Methods-Time Measurement
130. Plan and Control Production
133. Wage Incentives
135. How Good Is MTM?

Materials Handling

*147. Materials Handling in Today's and Tomorrow's Plants—*50¢*

*This was incorrectly listed as 146 last month

Electrical

101. Your Electric Motor
107. Revamping Electrical Distribution Systems
111. What Electric Distribution System for Your Plant

Costs

119. How to Organize for Cost Reduction
121. Telling Employees Why Costs Must Be Cut
132. Profit Leaks—How to Find Them and Plug Them

Editor, FACTORY 8-53
330 West 42nd St., New York 36, N. Y.

Please send me ..... copies each of the reprints represented by the numbers circled at 35¢ per copy* (special rates for 100 or more.)
I enclose check ( ), money order ( ) for $.....

Name .....

Address .....

City ..... Zone ..... State .....

15, 38, 45, 47, 86, 96, 101, 102, 103, 106, 107, 109, 111, 112, 113, 115, 117, 118, 119, 121, 125, 128, 129, 130, 131, 132, 133, 135, 136, 137, 139, 140, 142, 143, 144 145, 146, 147

*Except as noted above

MACHINE TOOLS

AUTOMATIC SCREW MACHINES

½" cap. Ceco, Swiss type, 5-slide, 3 spindle drill att., 1943. Spiro Mach. Tool Co., 239 Centre St., New York, N. Y.

1¼" Cap Brown & Sharpe No. 2G (1). Also Nos. 0G (8) & 00G (5). Aaron Machinery Co., 47 Crosby Street, New York 12, New York.

1⅜" Cap. Cleveland Model AA, Model B18—1½" Cap., Model B. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

1½" cap. Conomatic, 4 spindle with collets, threading, tapping, etc, 1940. Spiro Mach. Tool Co., 239 Centre St. New York, N. Y.

4¾" Cone 4 spindle, Bar, 1944; Green Bros. of Worcester, 957 Southbridge St., Worcester.

#0G Brown & Sharpe Motor-in-base. Tunnel Machy. Exchange, 353 Canal St., N.Y.C.

BORING MACHINES

Heald Model 46-B Single and Double-Eng. (3). 1944 models. Rebuilt. Production & Equipment Co., 1534 Trumbull, Detroit, Mich.

DRILLING MACHINES

Radial: 3' American 9" Rd. Column, Gear Box M.D. Delta Equip. Co., 148 N. 3rd St., Phila.

Radial: 3' American, Enclosed head, Excellent Condition. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

ENGRAVING MACHINES

#GK 2 Deckel, 3 dimensional with roll att., late. Lobile Mach'y Co., 151 Baxter St., New York, N. Y.

Nos. 1D, ME, 3U32 Models Gortons. Others. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

GEAR CUTTING MACHINES

#2 Gleason Hypoid Gear Generator Serial #27158, less than 200-hours use, new 1952, New York City Area. FS-8647, Factory Management & Maintenance.

#4 Gleason Angular Hand Tester, Serial #26541, less than 200 hours use, new 1952, New York City Area. FS-8649, Factory Management & Maintenance.

#7 Gleason Cutter Sharpener, Serial #36415, less than 200 hours use, new 1952, New York City Area. FS-8648, Factory Management & Maintenance.

#725 Fellows Gear Shaper, Serial #27935, less than 200 hours use, new 1952, New York City Area. FS-8648, Factory Management & Maintenance.

GRINDING MACHINES

Cylindrical: #2 Brown and Sharpe 14" x 36" Motor Drive, Bargain. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

Cylindrical: 10" x 24" Landis, type C, Univ. Hyd. All-State Mach'y Corp. 183 Centre St., N.Y., N.Y.

Internal: #72A3 Heald, 1943, Equipped. Green Bros. of Worcester, 957 Southbridge St., Worcester, Mass.

Radius: 2 No. 3½ Van Norman. Gordon Industrial Co. Inc., 189 Lafayette St., New York 13, N. Y.

Surface: #2 Brown & Sharpe, 6" x 18", new 1944. Tri Machine & Tool Co., 248 Lafayette St., NYC.

Surface: #2 Reid, 6" x 18" Capacity Magnetic Chuck Motor, New 1940. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

Surface: Gallmeyer & Livingston No's. 55 x 65 Hyd. with coolants. Aaron Machinery Co., 47 Crosby St., N. Y.

Thread: No. 2 Dalzan—Late Type—with hob grinding attach. U.S. Machinery & Motor Co., 179 Lafayette St., N. Y. 13, N. Y.

Thread: Jones & Lamson Mod. T.G.-615 with truing device, helix att. cpl. with motors. Aaron Machinery Co., 47 Crosby St., N. Y.

Tool & Cutter: No. 1 & No. 2 Norton chuck, motors and starter. Aaron Machy. Co., 47 Crosby St., NYC 12.

LATHES

12"x30" American, geared head with motor-in-base, coolant pump, 12"—4 jaw chuck, steady rest, collet attachment, collets. Aaron Machinery Co., 47 Crosby St., New York, N. Y.

12½" x 40"centers (2) New Rocco at cost Price $1750 ea. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

16"/24"x150" C C Monarch Series 60 Toolmakers lathe, New 1948. United Machinery & Tool Corp., 89 Central Street, Worcester 8, Mass.

16" x 30" CC Monarch Model C-Y Toolmakers lathe. New 1947. United Machinery & Tool Corp., 89 Central Street, Worcester 8, Mass.

16" x 60" centers New Troglia, Taper att. at cost price $3250. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

18" x 8' Hendy, taper att., m.d. Mickleburgh Mach'y Co. Inc., 3130 Balgrade St., Phila, Pa.

18" x 54" Monarch, gr. hd., mt. in base, Timken bearings, 12"—4 jaw Cushman chuck, accessories. Kallor Machinery Co. Inc., 199 Centre St., N.Y. 13, N.Y. CAnal 6-2912.

20" x 10' Centers Walcott, Quick Change, Motor Drive, Taper Attachment, Sacrifice price. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

25" x 12' Sidney Quick Change, Motor Driven. Delta Equip. Co., 148 N. 3d St., Phila.

Heavy Duty: LeBlond, swing 25/50x96" centers, sliding bed gap, plain & compound rests, tool post, face plates, 10 HP/220/3/60 motor. Aaron Mach'y Co., 47 Crosby St., New York 12, N. Y.

LATHES—PRODUCTION

Lo-Swing: 8" x 108", 2 auto. carriages. Alliance Machinery Exchange, 206 Centre St., N.Y.C. CAnal 6-0206.

LATHES, TURRET

1" Cap. Rivett cabinet type, 1944. Spiro Machine Tool Co., 239 Centre St., New York, N. Y.

10" cap. Libby. All-State Mach'y Corp., 183 Centre St., New York, New York. CAnal 6-5190.

(5) #2 W & S Cap. 1" (1941) (3) Bar Feed (2) Chuckers, cheap $1750. ea. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

#3 Bardons & Oliver, Univ. 2" cap. All-State Mach'y Corp., 183 Centre St., N. Y., N. Y.

Nos. 5, 4, 3, 2A, 2 & 1 Warner & Swasey. Aaron Machinery Co., 47 Crosby St., NYC 12.

Nos. 5 (Bar Feed), 4R (9¼" Spindle hole), & 2L Gisholt. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

Nos. 7, 5, & 2 Bardons & Oliver. All bar feed. Aaron Machinery Co., 47 Crosby St., NYC 12.

Nos. 8A and 9A Jones & Lamson, Saddle Type Universal Turret Lathes. Wigglesworth Industrial Corp., 196 Bent St., Cambridge 41, Mass.

MILLING MACHINES

1—Heavy Horiz. single pulley, Br. & Sh. #5B—Cheap. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

Plain: No. 5 Cincinnati Hi-Power Miller, M.D. Wigglesworth Industrial Corp., 196 Bent St., Cambridge 41, Mass.

Vertical: No. 2K K & T, power down to head, power feed & rapid traverse throughout, late type. United Machinery Tool Corp., 89 Central Street, Worcester 8, Massachusetts.

Vertical: No. 2 Maximiller, late, power feed all direction. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

Vertical: #08 Cincinnati, late. Lobile Machinery Co., 151 Baxter St., New York, N. Y.

Vertical: Model 3VG Reed Prentice, Vert. Miller and Die Sinker, late, Complete. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

1—Vertical, Single Pulley, Br. & Sh. #5—Cheap. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

Production: 24" Cincinnati. Delaware Equipment Co., 124 N. 3rd St., Phila., Penna. LO 3-4930.

Production: Sundstrand Rigidmil, hyd. feed, 14½" x 50" table, motor & coolant in base. Spiro Machine Tool Co., 239 Centre St., New York.

Production: No. 5—60 Cinn. plain hydromatic, 60" table traverse, late type. United Mach'y & Tool Corp., 89 Central St., Worcester 8, Mass.

#2B Hendey universal, m.d. Mickleburgh Mach'y. Co. Inc., 3130 Belgrade St., Phila., Pa.

#3 Cincinnati; Motor Drive. Delaware Equipment Co., 124 N. 3rd St., Phila., Penna. LO 3-4930.

#2G Univ. Kempsmith, All-State Mach'y Corp., 183 Centre St., N. Y. CAnal 6-4190.

MULTAUMATICS

12" Bullard Type D 8-Spindle, Power Chucking, Well Tooled, 1941. The MacDell Corp., 1042 W. Lake St., Chicago 7, Ill.

PLANERS

30" x 20" x 12' Niles Bement Pond, 4 heads, D.C. Drive, Excellent Condition. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

42" x 42" x 14' Ponds (2); 3 heads; A.C. Motor Drive. C. G. Wyatt Machinery Co., Inc., 24th St. & Hayes Ave., Camden, N. J.

48" x 48" x 10' Sellers; 3 heads; D.C. Motor Drive. C. G. Wyatt Machinery Co., Inc., 24th St. & Hayes Ave., Camden, N. J.

60" x 60" x 20' Niles Bement Pond, 4 heads, D.C. Drive, Excellent Condition. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

POWER PRESSES

25 ton V&O, high speed, roll feed, Late. All-State Machinery Corp., 183 Centre St., N.Y.C.

45 Ton #71 Cleveland OBI 3" stroke, M.D. Interstate Mchy. Co., Inc. "A" & Venango, Phila.

88 ton #5-E Bliss Double Crank, 66" wide. Hyman Press Sales, 225½ Lafayette St., N.Y.C.

180 ton #307 Bliss Single Crank, Tie Rod. Hyman Press Sales, 225½ Lafayette St., N.Y.C.

250 ton Toledo Knuckle Joint, 5" stroke. Hyman Press Sales, 225½ Lafayette St., N.Y.C.

Nos. 18, 19, 20 & 21 Bliss presses. Late type, in stock. Allied Machinery Exchange, 210 Centre St., N.Y.C. Phone: CAnal 6-1587.

POWER SHEARS

10' x 3/16" Niagara, with gauges. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

36" x 18 g. Famco Power New in crate with motor List $850. Our price 650. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

SHAPERS

16" Cincinnati Back geared crank, 8 speed factory motor drive. Fitzpatrick and Walsh, 2439 N. 9th St., Phila 33, Penna.

20" Smith & Mills, grd. hd., m.d. Mickleburgh Mach'y Co. Inc., 3130 Belgrade St., Phila. Pa.

32" Cincinnati Heavy Duty, Motorized. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

WANTED

High prices paid for good used machine tools. Trades accepted. Alliance Machinery Exchange. 206 Centre St., N.Y.C., CAnal 6-0206.

ELECTRICAL / POWER EQUIP

AIR COMPRESSOR

270 C.F.M. Worthington 2 Stg., 600 lbs. Press, Belt Drive. Delta Equip. Co., 148 N. 3d St., Phila.

BLOWERS

4,000 CFM 3 lbs. pr. Ingersoll-Rand FS-538 Motorblower. Perry Equipment Corp., 1426 N. 6th St., Phila. 22, Pa.

7,000 CFM—20 Oz., 60 HP. Turbo: Sturt. Superior Equipment Co., 140 Grand St., N.Y.C.

BOILERS

300 H.P. Internat'l Scotch type boiler. 150#. Other sizes in stock. M. J. Hunt's Sons, 1618 N. Delaware Ave., Phila. 25, Pa.

GENERATORS

75 KW Rebuilt MG Set—250 V DC, 1200 RPM. J. F. Joyce, 1816 Callowhill St., Phila.

HEAT CONTROL RECORDERS

Wheelco Capacilogs (3) New in original crates, less than ½ of Cost. Price $200 ea. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

HEAT UNIT

20 KW—Gen. El. Induction, Tube Type (1948) Single position, Quench sink, Reasonable. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

MOTORS

200 HP Westinghouse, new XP class 1, group D, 3/60/2300/1200 RPM. Liberty Motor and Machinery Co., 807 W. Lake St., Chicago, Ill.

350 Burke (2), TEFC, 3/60/440/3600 RPM. Liberty Motor and Machinery Co., 807 W. Lake St., Chicago, Ill.

PUMPS

Centrifugal, Bronze Motorpump: Ingersoll-Rand. 200 GPM—230', 20 HP, 3/60/220-440 TEFC. Perry Equipment Corp., 1426 N. 6th St., Phila. 22, Pa.

WELDER

400A West. Flex Arc DC Welder—AC Drive. J. F. Joyce, 1816 Callowhill St., Phila.

MATERIAL HANDLING EQUIP.

CRANES

15 ton P & H; O.H/E.T.C. 88'4" Span; D.C. C. G. Wyatt Machinery Co., Inc., 24th St. & Hayes Ave., Camden, N. J.

25 ton Browning Portal Gantry; D.C. C. G. Wyatt Machinery Co., Inc., 24th St. & Hayes Ave., Camden, N. J.

(Continued on the opposite page)

(Continued from opposite page)

3000# to 10,000# cap. electric or gas cranes. Mobile Ind. Equip. Corp., 9th & Tioga, Phila. 40, Pa.

INDUSTRIAL TRUCKS

2 & 4 wheel Hand and Platform Trucks, Racks, conveyors, Box trucks. Repaired—Bought—Sold. A. Liss & Corp. 747 6th Ave., N.Y. AL 5-2165.

LIFT TRUCKS

3500 lb. capacity, Barrett-Cravens, Model "FXK" Hydraulic Lift Trucks, Reconditioned, only $99.50 each. Globe Trading Co., 1815 Franklin St., Detroit 7, Mich.

2000# to 6000# cap. electric Lift Truck. Mobile Ind. Equip. Corp., 9th & Tioga, Phila. 40, Pa.

4000# to 6000# cap. solid or pneu. Lift Truck. Mobile Ind. Equip. Corp., 9th & Tioga, Phila. 40, Pa.

MATERIALS & PARTS

LIGHT BULBS

Wabash—Sylvania Electric, 1000 Watt, 230/250 Volt, type PS-52 clear Mogul screw socket 19500 lumens, 1000 hrs., rated life. Original packing. Surplus New. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton 7, N. J.

MILLING MACHINE PARTS

Milling machine arbors, adaptors, collets, and equipment for all model machines. DeWitt Equipment Co., 136 Lafayette St., New York City, N. Y.

PLANT EQUIPMENT

Magnetic Inspection Unit; Degreasers; Paint Sprayer & Dryer, Infra-Red; Heat Exchanger, Niagara: Drying Ovens; Scale, 6' x 8' Platform, 10-Ton. General Machinery, 3544 LaSalle, St. Louis 4, Mo.

Large stock of Drills, Taps, Dies, Milling Cutters, Holder, Adapters, Sleeves, Centers. Good used condition. Must liquidate at once. Crown Machinery Co., 2323 North Ninth St., St. Louis 6, Mo. Central 1313.

WANTED

We Buy surplus valves & fittings, ¼" to 60". Iron-Steel-Brass. Odd sizes & regular. Daniel Smith V&F Corp., 313 E. 31 St., N.Y.C. 16, N.Y. MUrray Hill 3-5159.

EMPLOYMENT

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

SHOP SUPERINTENDENT wanted by expanding machinery dealer, specializing in rebuilding airtools, riveters and plant equipment. Good pay for energetic man who can supervise 4 to 6 men and make own repair parts when necessary. Write fully in confidence, giving qualifications, experience, salary expected. Montogemry Engineering Company, 1732 Philadelphia, Detroit 6, Mich.

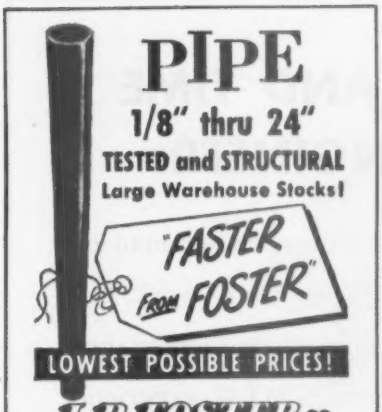
WORKS MANAGER to direct manufacturing in small progressive company producing precision machine tools. Experience light machine tooling in precision job shop required. M.E. degree. Age: Under 45. Compensation: $15,000-$20,000. 300 employees. P-8370, Factory Management & Maintenance.

POSITIONS WANTED

TOP MANAGEMENT Executive available. Diversified combination of management experience now available in 47 year old garduate engineer. Proven record of accomplishment — District Industrial Engineer, Supervisor of Administration Planning, 13 yrs. U.S. Steel Corp. and Subsidiaries; Chief Industrial Engineer, 6 yrs., Montgomery Ward & Co.; presently associated with leading national mg't-consulting firm in Chicago. Thoroughly qualified to handle production, industrial engineering, operations, or planning. Excellent references available. Average earnings past few years approximately $20,000. PW-866, Factory Management & Maintenance.

PLANT MANAGER qualified by proven record in all phases of plant operation and management functions, M.I.T. graduate. PW-8497, Factory Management & Maintenance.

FACTORY MANAGER, 42, Grad. M.E. Thorough practical shop exp., Tech. Sales, Prod'n Mgr., Design Engrng., Tooling Lay-out, Operation. Details furnished on request. PW-7662, Factory Management & Maintenance.


PIPE
1/8" thru 24"
TESTED and STRUCTURAL
Large Warehouse Stocks!
"FASTER FROM FOSTER"
LOWEST POSSIBLE PRICES!
L.B. FOSTER CO.
Pittsburgh 30, Pa. • Los Angeles 5, Cal.
Houston 2, Tex. • Chicago 4, Ill. • New York 7, N.Y.

A.G.
DIESEL ENGINES • GENERATOR SETS
10 TO 2000 KW • AC&DC • GUARANTEED
SCHOONMAKER CO., INC.
Plants: SAUSALITO(S.F.)CAL., JERSEY CITY, N.J.

SETTLED
Commercial and Industrial Concrete Floors and Airport Runways. Raised and Stabilized by Hydraulic Pressure. 15 yrs. experience.
LEE AND COMPANY
Lee Garell, *Mgr.*
4545 De Tonty St. Louis 10, Mo.
Mohawk 4414

SALARIED POSITIONS $3,500 — $35,000
We offer the original personal employment service (established 43 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars.
R. W. BIXBY, Inc. 276 Dun Bldg., Buffalo 2, NY

POSITIONS OPEN
3 Works Managers $12,000 to $20,000; Chief Engr. Pumps $15,000; Chief Engr. Stampings $16,000; Supt. Refrigerator Mfg. $12,000+; Estimator Pumps $5400; Dist. Sales Engr. $12,000+; Production Supt. Stampings $13,500; Industrial Engineer $12,000; Designers, Checkers, Draftsmen all kinds. Employers pay fee most cases. Estabi. 38 yrs.
HARRISON PERSONNEL SERVICE
20 W. Jackson Blvd. Chicago 4

EXECUTIVES AND TECHNICAL MEN
Desiring Positions with Stability
We solicit inquiries from qualified candidates who desire to contact employers for positions paying $5000 to $25,000 per year. Confidential. Est. 39 years.
(Inquiries from Employers entail no obligation)
THE NATIONAL BUSINESS BOURSE
20 W. Jackson Blvd., Chicago 4

SPECIAL SERVICE

Time Study Equipment

Boards with U.C.E.Z. transparent watch holders, stop watches. Pedometers, Slide Rules. Time study forms in stock. Sample kit free. Oznam Products Co., 5544 So. Homan Ave., Chicago 29.

TRANSFORMERS FOR SALE

3—	1000 KVA Mol	11500—2400/4160Y
3—	500 KVA G-E	22000—2300/4000Y
3—	333 KVA W-H	13200—2400/4160Y
3—	333 KVA W-H	6600—2300
3—	333 KVA Mol	7200/12470Y—2400/4160Y
3—	250 KVA G-E	6600—575
3—	150 KVA G-E	19050/33000Y—2540/4000Y
2—	150 KVA G-E	6900—230/460
3—	100 KVA G-E	33000—6900—11950Y
3—	100 KVA G-E	13200—2300
3—	50 KVA A-Ch	33000—6900/11950Y
3—	50 KVA A-Ch	33000—2400/4160Y

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.
CINCINNATI 27, OHIO
40 Years Dependable Service

ALL MAKES OF GUARANTEED REBUILT TIME CLOCKS
INTERBORO TIME CLOCK CO.
787 Sixth Ave., New York, N. Y.
ALgonquin 5-1175

ENGINEER
are you interested in
MANAGEMENT?

ACHIEVE success by entering management. Use your engineering training and experience to guide others in producing highly technical products. Positions are now open for foremen of television and other electronic production departments.

IF you have a degree in electrical, mechanical or industrial engineering, investigate your opportunities in the fast-growing Sylvania organization.

JOHN WELD
Department D
SYLVANIA ELECTRIC PRODUCTS INC.
Radio and Television Division
254 Rano Street
Buffalo 7, New York

Additional Positions Vacant Advertising on page 308

METHODS AND TIME STUDY ENGINEER

Industrial Engineering position open for man experienced in Methods and Time Study work. One or more years' experience in machine shop or sheet metal operations is essential. MTM experience would be highly desirable. Address Glenn Johnson:

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

INDUSTRIAL ENGINEER

Opportunity for M. E. graduate with 10 years or more experience to head industrial engineering section. Know tool and die design, jig and fixture design, methods, plant layout, cost reduction. Must be thoroughly familiar with machining and assembly including most modern types of equipment. Will supervise all plant and process engineering, standards, plant machinery and tool maintenance. Salary, bonus, merit increases, paid sick leave, profit sharing retirement plan. The position is with a long established but growing company located in a small mid-western town.

P-8418, Factory Management & Maintenance
520 N. Michigan Ave., Chicago 11, Ill.

GENERAL PRODUCTION MANAGER

To coordinate all production activities for the largest house-to-house bakery with plants in Omaha, Indianapolis, Peoria, Milwaukee, Columbus, and Cleveland—headquartering in Omaha.

Prefer chemical engineer with successful record of experience in modern mechanized production methods and who has demonstrated he can handle himself and others. Bakery experience desirable but not essential.

Age range 30-45, salary open.

Outstanding opportunity for someone who can accept responsibility in a rapidly expanding organization.

Reply held confidential if desired. Write giving complete resume of background including past earnings to J. B. FAGOT.

OMAR Incorporated
1910 HARNEY, OMAHA, NEBRASKA

INDUSTRIAL ENGINEER CONSULTANT

An established, highly rated management consulting firm located in the Middle West is now seeking a permanent Staff Industrial Engineer with experience in manufacturing industrial engineering, probably now as Chief Industrial Engineer or Assistant. M.T.M. training helpful. You will work with clients on stimulating programs. If you travel during the week, you will be home over weekends. Engineering degree desirable. Opportunity limited only by your own capacities. Age 30 to 45. Salary related to qualifications offered. If you wish a desirable connection, your confidential interest will be welcomed and respected.

P-8481, Factory Management & Maintenance
330 W. 42 Street, New York 36, N. Y.

CHIEF DESIGN ENGINEER

Opportunity for M. E. graduate with at least 10 years of experience in mechanical design and design supervision. Will be in charge of the design of electro-mechanical devices used in electrical power transmission and distribution. Will direct design engineers and draftsmen and be responsible for final product design. Must have thorough knowledge of manufacturing processes. Good salary, merit increases, paid sick leave, profit sharing retirement plan. The position is with a long established but growing company located in a small mid-western town.

P-8415, Factory Management & Maintenance
520 N. Michigan Ave., Chicago 11, Ill.

Manufacturing Vice President
Age 55 to 60
$30,000 to $40,000
See page 304 for complete details

INDUSTRIAL CONSULTANTS

INDUSTRIAL CONSULTANTS

METHODS ENGINEERING COUNCIL
H. B. MAYNARD, President
Consultants in Industrial Management
718 Wallace Ave.—Pittsburgh 21, Pa.

DRAKE, STARTZMAN, SHEAHAN and BARCLAY
Distribution and Materials Handling Consultants
"Control, Movement and Storage of Materials"
70 East 45th Street — New York 17, N. Y.

GEORGE H. KENDALL
Consulting Mechanical Engineers
Methods Studies: Process or Product.
Redesign Existing Products for Greater Profit.
Trouble Shooting Production, Design, Cost Problems.
Specialists Automatic Machinery, Processes, Controls.
New Developments, Patent Studies, Investigations.
New Products & Process Engineering Studies
P. O. Box 3 (Est. 1923) Tel. Darien 5-1504
Norton Heights 3 Offices Darien, Connecticut

ALLAN H. MOGENSEN
Director
Work Simplification Conferences
330 W. 42nd Street — Box 30
New York City — Lake Placid, N. Y.

THE EMERSON ENGINEERS
Have served Top Management in Advisory Capacity since 1899
30 Rockefeller Plaza
New York 20, N. Y.
1213 N. Highland Ave.
Los Angeles 38, Cal.

A. L. KRESS
Management Consultant
Organization Planning — Cost Reduction Programs
Supervisory Training — Production Control
Salary and Wage Administration
Preparation of Cases for Labor Arbitration
180 Springdale Road — Princeton, New Jersey
Phone Princeton 1-4310

W. W. SLOCUM & CO.
Engineers
Industrial—Design—Management
744 Broad St., Newark 2, N. J.

GEMAR ASSOCIATES
CONSULTING
MATERIALS HANDLING
ENGINEERS
Over 20 Years Experience
Greenwich, Connecticut

McCORMICK & COMPANY
Management Engineers
PROFIT LEAKS
How to Find Them and Plug Them
Park Building — Yonkers, N. Y.
Phone Yonkers 8-7600

WHEELER ASSOCIATES, INC.
- *Cost Reduction Training Programs*
- *Work Conferences*
- *Operating Consultants*

15017 Detroit Ave. — Cleveland 7, Ohio

How to keep informed on the "with what" part of your business

AT YOUR FINGER TIPS, issue after issue, is one of your richest veins of job information – advertising. You might call it the "with what" type – which dovetails the "how" of the editorial pages. Easy to read, talking your language, geared specifically to the betterment of your business, this is the kind of practical data which may well help you do a job quicker, better – save your company money.

Each advertiser is obviously doing his level best to give you helpful information. By showing, through the advertising pages, how his product or service can benefit *you* and *your* company, he is taking *his* most efficient way toward a sale.

Add up all the advertisers and you've got a gold mine of current, on-the-job information. Yours for the reading are a wealth of data and facts on the very latest in products, services, tools . . . product developments, materials, processes, methods.

You, too, have a big stake in the advertising pages. Read them regularly, carefully to keep job-informed on the "with what" part of your business.

McGRAW-HILL FOR BUSINESS

McGRAW-HILL PUBLICATIONS

Index To Advertisements

This index is a service to readers. Every effort is made to maintain its accuracy, but FACTORY MANAGEMENT and MAINTENANCE assumes no responsibility for errors or omissions.

Abrasive Products, Inc. 212
Acme Industries, Inc. 33
Acme Steel Company 169
Adam Electric Co., Frank 197
Aget-Detroit Company 198
Air Express Division, Railway Express 62
Alan Wood Steel Company 196
Allegheny Ludlum Steel Corp. 200
Allen-Bradley Company 56
Allen Company, Inc., L. B. 198
Allen Manufacturing Co. 215
Allis-Chalmers Mfg. Co. 9, 18, 40, 41, 145, 213
Allis-Chalmers Mfg. Co. Tractor Division 261
Alsynite Company of America 284
Alvey-Ferguson Company 150
American Airlines, Inc. 225
American Bitumuls & Asphalt Co. 274
American Blower Corporation Insert 16B
American Monorail Company 229
American Mutual Liability Insurance Company 44, 45
American Photocopy & Equipment Company 294
American Screw Company 21
Anaconda Wire & Cable Co. 51
Anderson Company, V. D. 160
Armour & Company 194
Aro Equipment Corp. 237
Arro Expansion Blot Co. 152
"Automatic" Sprinkler Corporation of America 162
Automatic Transportation Co. 15

Baker-Raulang Company 7
Barreled Sunlight Paint Co. 19
Bassick Company 195
Bausch & Lomb Optical Co. 289
Bay State Abrasive Products Co. 202, 203
Beltraction Company 256
Benjamin Electric Mfg. Co. 227
Bituminous Coal Institute 52
Bostitch, Inc. 188
Boston Gear Works 60, 61
Brown & Sharpe Mfg. Co. 36
Buckeye Tools Corp 226
Bullard Company 235

Centric Clutch Company 252
Century Electric Company 260
Chain Belt Company 233
Champion Lamp Works 166
Chester Hoist Division National Screw & Mfg. Co. 192
Chicago Eye Shield Company 164
Chicago Pneumatic Tool Company 266
Chisholm-Moore Corporation 236
Clark Equipment Co., Industrial Truck Division 139
Cleveland Cap Screw Company 180
Cleveland Crane & Engineering Co., Machinery Div. 46
Cleveland Crane & Engineering Co., Tramrail Div. 47
Coffing Hoist Company 201
Colson Corporation 189
Continental Steel Corporation 206
Cone Automatic Machine Co., Inc. 199
Coppus Engineering Co. 63
C-O-Two Fire Equipment Co. 217
Crane Company 17
Crescent Truck Div., Barrett-Cravens 259
Curtis Pneumatic Machinery Div., Curtis Manufacturing Co. 243

Day-Brite Lighting Co. 276
Dayton Rubber Company 143
De Laval Separator Co. 20
De Laval Steam Turbine Co. 48
Delco Products Div. General Motors Co. 251
Delta Power Tool Div., Rockwell Mfg. Co. 30, 31
Derby Sealers, Inc. 206
Diamond Chain Company, Inc. 53
Dolge & Co., C. B. 186
Dracco Corporation 312
Dravo Corporation 247
du Pont de Nemours & Co. (Inc.), Textile Fibers Dept. 49
du Pont de Nemours & Co. (Inc.), Kinetic Chemicals Division 155
Duro-Test Corporation 265

Electric Controller & Mfg. Co. 66, 67
Edison Storage Battery Div., Thos. A. Edison, Inc. 58
Electromode Corporation 250
Elwell-Parker Electric Co. 13
Euclid Crane & Hoist Company 282

Factory Management & Maintenance 305
Fafnir Bearing Company Second Cover
Fairbanks-Morse & Company 37
Felters Company 254
Fenwal Inc. 65
Finnell System Inc. 205
Flintkote Company 14
Foote Bros., Gear & Machine Corp. 255
Foote Gear Works, Inc., Brad 68
Fostoria Pressed Steel Co. 296

Gardner-Denver Company 151
General Box Company 168
General Cable Corporation 42, 43
General Electric Company Apparatus Dept. 26, 27, Insert 48A-48B, 70, 71, 240, 241
General Electric Company Construction Materials Div. 54, 55
General Electric Company Lamp Dept. 269
Goodrich Company, B. F. 1, 6
Goodyear Tire & Rubber Co. 73
Gould National Batteries, Inc. 64
Graybar Electric Company 219
Grinnell Company, Inc. 10
Gummed Products Company 282

Hall Laboratories, Inc. 223
Hapman Conveyors, Inc. 216
Haynes Products Co. 198
Hercules Powder Co. 22
Hinde & Dauch 5
Honan-Crane Corporation 263
Hood Rubber Company 296
Hudson Pulp & Paper Corp. 182
Hyatt Bearings Div., General Motors 135
Hy-Test Safety Shoes, Div. of International Shoe Co. 187

Ingersoll-Rand 231
Invincible Vacuum Cleaner Mfg. Co. 270

Johns-Manville Corp. 267
Jones & Lamson Machine Co. 257
Jones & Laughlin Steel Corp. 216

Keasbey & Mattison Co. 288
Keller Tool Company 178, 252
Kentile, Inc. 161
Kex National Service 172
Kidde & Co., Walter 173
Kinney Manufacturing Co. 262
Korfund Company, Inc. 244

Lea Mfg. Co. of Michigan, Inc. 290
Lewis-Shepard Products, Inc. 171
Lindberg Engineering Company 157
Linde Air Products Co., Div. of Union Carbide & Carbon Corp. 183
Link Belt Company 8, 57
Lubriplate Div., Fiske Bros. Refining Co. 198
Lyon Metal Products, Inc. 153

Mahon Company, R. C. 253
Manning, Maxwell & Moore, Inc. 272
Master Builders Co. 193
Master Electric Company Fourth Cover
Mathews Conveyer Company 230
MB Manufacturing Company, Inc. 292
McCaskey Register Company 144
McGraw-Hill Book Co. 300
Mechanical Handling Systems, Inc. 176
Mercury Manufacturing Co. 278
Metallizing Engineering Co., Inc. 250
Micro Switch Corporation 184
Mid-States Gummed Paper Company 290
Minneapolis-Honeywell Regulator Co., Industrial Div. 149
Minnesota Mining & Mfg. Co. 271, 285
Miracle Adhesives Corp. 290
Mississippi Glass Co. 293
Mobilift Corporation 167
Monarch Machine Tool Company 249
Morse Chain Co. 281

National Electric Products Corp. 34, 35
Nelson Division, Herman 274
Newcomb-Detroit 296
New York Belting & Packing Co. 12
Niagara Blower Company 156
Norton Company 28

Osborn Manufacturing Co. 4

Pangborn Corporation 248, 264
Pick Manufacturing Co. 292
Pioneer Rubber Company 280
Pittsburgh Plate Glass Co., Paints Div. Insert 16A
Powell Pressed Steel Co. 159
Punch-Loc Company 146

Quaker Rubber Corporation Division of H. K. Porter Co., Inc. 154

Radio Corporation of America 174
Ready-Power Company 232
Remington-Rand, Inc. 129
Republic Steel Corp. 304
Reynolds Metals Company 207
Richards-Wilcox Mfg. Co. 287
Robertson Company, H. H. 280
Rockbestos Products Corporation 239
Rome Cable Corporation 221
Roots-Connersville Blower Div., Dresser Industries, Inc. 190
Ross Carrier Company 220
Ruberoid Company 277
Ryerson & Son, Inc., Joseph T. 72

Sanymetal Products Co., Inc. 228
Schrader's Son, A. 245
Schramm, Inc. 303
Scott Paper Company 131
Signode Steel Strapping Co. 246
SKF Industries, Inc. 295
Skinner Co., M. B. 198
Sly Mfg. Company, W. W. 222
Solar-Sturges Mfg. Div., Pressed Car Steel Company, Inc. 210
Spang-Chalfant Division National Supply Company 32
Square D Company 147, Third Cover
Standard Conveyor Company 214
Standard Oil of Indiana 175
Standard Pressed Steel Co. 16, 286
Stewart Iron Works Co., Inc. 280
Strom Steel Ball Co. 244
Sugar Beet Products Co. 268
Sun Oil Company 133
Supreme Products, Inc. 208

Taylor Co., Halsey W. 276
Technical Writing Service 298
Templeton-Kenly & Co. 298
Texas Company 74
Thew Shovel Company 258
Thomas Flexible Coupling Co. 218
Thor Power Tool Company 137
Thread-Ezy Mfg. Co. 292
Tile-Tex Division, Flintkote Company 283
Tinnerman Products, Inc. 165
Toledo Scale Company 224
Towmotor Corporation 23
Trane Company 299
Tranter Manufacturing, Inc. 242
Tremco Manufacturing Co. 297
Tropical Paint & Oil Company 284
Trumbull Department, General Electric Co. 181

Udylite Corporation 179
Union Pacific Railroad 211
Union Metal Mfg. Co. 142
Union Oil Company 238
Union Steel Products Company 163
Union Wrie Rope Corporation 158
"Up-Right" Scaffolds, Inc. 177
U. S. Air Conditioning Corp. 304
U. S. Electrical Tool Div., Emerson Electric Mfg. Co. 294
U. S. Rubber Company 275
U. S. Rubber Company Electrical Wire & Cable Dept. 50
U. S. Steel Subsidiaries 29, 185
U. S. Steel Corporation 185
U. S. Steel Supply Company 29
Uvalde Rock Asphalt Co. 273

Valley Electric Corporation 274
Veeder-Root Inc. 11
Vestal, Inc. 148

Wayne Pump Company 279
West Disinfecting Company 59
Westinghouse Air Brake Company 24, 25
Westinghouse Electric Corp. 38, 39, 191, 301
Westinghouse Electric Co. Sturtevant Div. 291
Westinghouse Electric Co. X-Ray Div. 170
Whiting Corporation 234
Wilshire Power Sweeper Co. 300
Worthington Corporation 209

Yale & Towne Mfg. Co. 69
Young Radiator Company 256

■

INDUSTRIAL CONSULTANTS

■

SEARCHLIGHT SECTION

(Classified Advertising)
H. E. Hilty, Mgr.

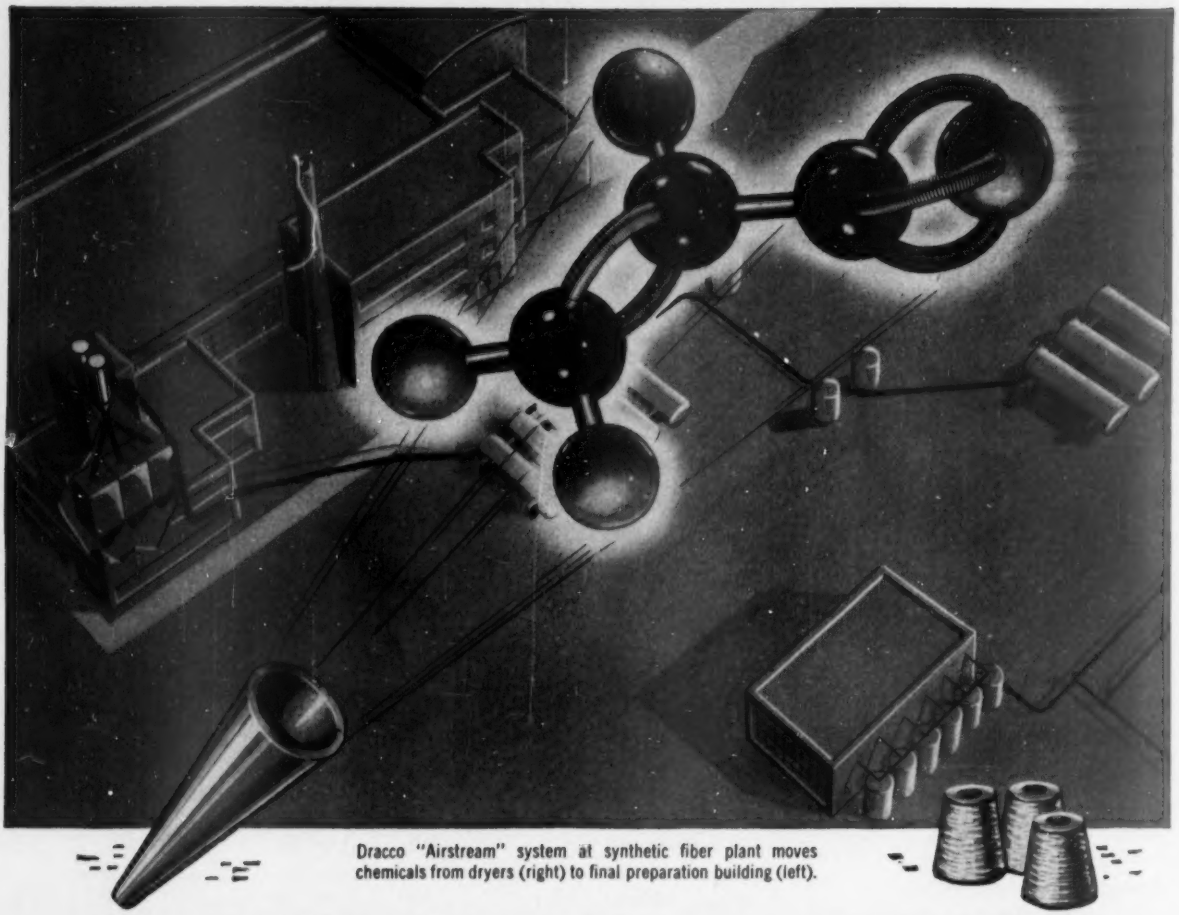
EMPLOYMENT
Positions Vacant 307, 308
Positions Wanted 307

Employment Services 307

SPECIAL SERVICES 307

EQUIPMENT
(Used or Surplus New) 306, 307

WANTED
Equipment 307



Dracco "Airstream" system at synthetic fiber plant moves chemicals from dryers (right) to final preparation building (left).

JET-PROPELLED CHEMICALS FOR MIRACLE FIBERS

Handling Problem — To move powdered intermediate chemicals some 600 feet from primary processing to final processing at a large synthetic fiber plant. System must be simple, fast and economical—and must handle materials without loss or contamination.

Dracco Solution — Application engineering by Dracco proved that the best solution for this materials handling problem was a custom-engineered, automatic Dracco "Airstream" Conveyor. This system (in diagram form) is shown above.

Result — The Dracco "Airstream" Conveyor provides simplified, accurate handling which eliminates expensive manual methods. Self-cleaning, it guards the required high purity of chemicals for producing modern "miracle" fibers.

Materials from primary process dryers are now weighed, fed into the "Airstream" system—then jet-propelled directly to final preparation tanks. Transported at five tons per hour through the enclosed, dust-free system, there is no chance for waste or contamination.

Dracco engineers will be glad to explain how the cost-cutting "Airstream" technique can simplify your bulk materials handling problem. Write or call today.

DRACCO CORPORATION
4075 East 116th Street • Cleveland 5, Ohio

"Bulk Materials Handling with 'Airstream' Conveyors" is the title of Dracco Bul. 529. Request your copy now.

DRACCO *Performance Proved*

Airstream **CONVEYORS • DUST CONTROL EQUIPMENT**

for time-saving, money-saving

POWER DISTRIBUTION

SQUARE D FEED-IN DUCT

is the most efficient way to transmit large amounts of power. It provides the lowest known voltage drop—only 1.8 volts per 1000 amperes per 100 feet.

Exclusive design requires no ventilation—permits a totally enclosed, compact, dust-excluding enclosure. Rigid construction provides high resistance to heavy electrical stresses.

SQUARE D PLUG-IN DUCT

provides flexible power distribution for branch circuits. Machinery can be rearranged quickly at minimum cost. Plug-in units can be attached at frequent intervals along the length of the duct, providing power where it's needed, when it's needed.

BUSWAY FEATURES PROVE DESIGN LEADERSHIP

NEW JOINT DESIGN. Feed-in Duct joint design saves installation time and reduces maintenance cost. Duct ends are identical—unnecessary to select mating ends before positioning or hanging duct sections. Outward-facing, pre-installed bolts permit rapid assembly and easy maintenance.

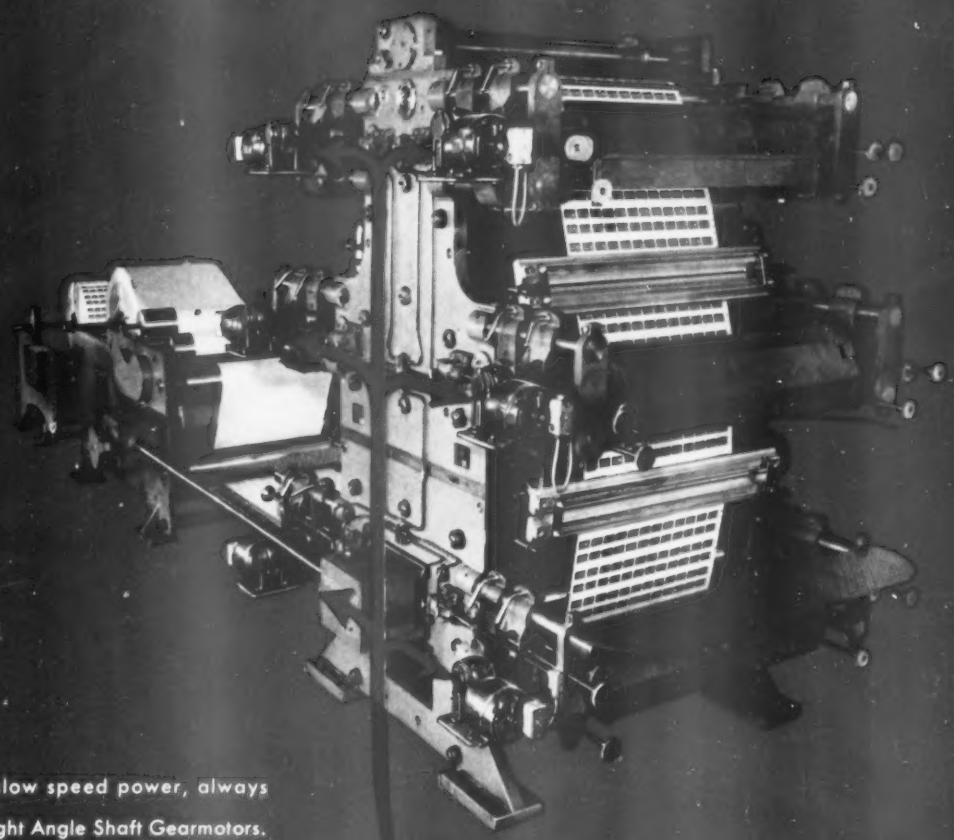
ROUND BUS BARS for Plug-in Duct provide greater mechanical strength and resistance to short-circuit stresses. Circuit breaker or fusible type plug-in units are easily installed at 2-foot intervals along both sides of the duct. Plug-in stabs grip the round bus bars with exceptionally high pressure.

FLEXIBLE CONNECTORS of laminated copper join bus bars between sections—permit proper alignment, insure tight joints and provide for expansion and contraction at Plug-in duct joints. All bolt heads face outward for greater accessibility.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

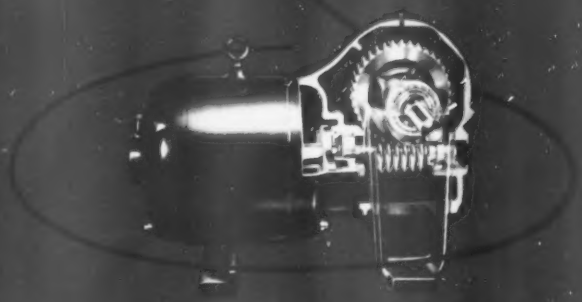
1903 • 50 YEARS OF DESIGN LEADERSHIP • 1953



When you must have slow speed power, always consider first MASTER Right Angle Shaft Gearmotors. They're very compact . . . low in cost . . . safe . . . and so easy to use.

And nowhere else can you get anywhere near the wide range of selection that you have in MASTER Right Angle Gearmotors. They're available in sizes ⅛ to 25 Horsepower for all electrical specifications and in splash-proof, enclosed or explosion-proof construction. Gear reduction ranges up to 430 to 1 with the countershaft in either horizontal or vertical positions. In addition these gearmotors can be supplied with integrally built electric brakes . . . three types of variable speed units . . . and with fluid drive units for cushioned power.

Try them . . . you'll find they're the horsesense way to get slow-speed horsepower.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

you can't beat them for compact slo-speed power